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NATIONAL DAM INSPECTION PROGRAM. BRADLEY LAKE DAM (INVENTORY NY--ETC(U)
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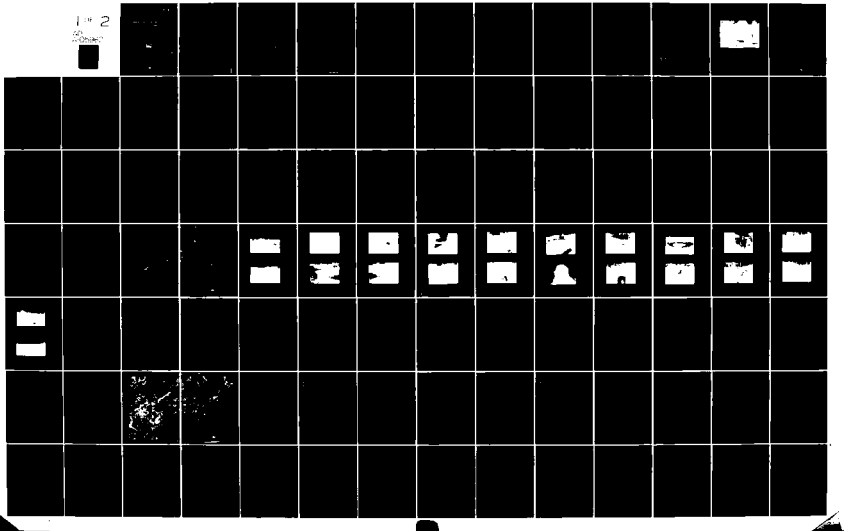

(3)

LOWER HUDSON RIVER BASIN

CITY OF TROY

RENSSELAER COUNTY, NEW YORK

LEVEL II

BRADLEY LAKE DAM

NY 00755

(15) DACW51-81-C-0014

(10) Kenneth J. Male
W. M. Smith, Jr

PHASE I INSPECTION REPORT

(6) NATIONAL DAM INSPECTION PROGRAM.

Bradley Lake Dam (Inventory Number NY 00755).
Lower Hudson River Basin. City of Troy
Rensselaer County, New York. Phase I
Inspection Report.

DEPARTMENT OF THE ARMY
NEW YORK DISTRICT, CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, NY 10278

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(11) JUL [redacted] 81

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A105 962	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Bardley Lake Dam Lower Hudson River Basin, Rensselaer County, N.Y. Inventory No. 755		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) KENNETH J. MALE		8. CONTRACT OR GRANT NUMBER(s) DACW51-81-C-0014 ✓
9. PERFORMING ORGANIZATION NAME AND ADDRESS C.T. Male 3000 Troy Road Schenectady, New York 12309		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army 26 Federal Plaza New York District, CofE New York, New York 10287		12. REPORT DATE 18 August 1981
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza New York District, CofE New York, NY 10287		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety
National Dam Safety Program
Visual Inspection
Hydrology, Structural Stability
Bradley Lake Dam
Rensselaer County
Lower Hudson River Basin

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

Examination of available documents and visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some serious deficiencies which require further investigation and remedial work.

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 13% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

Therefore, it is recommended that within 3 months after receipt of this report by the Owner, a detailed hydrologic and hydraulic analysis be started to better assess spillway capacity. This should include a more accurate determination of the site specific characteristics of the watershed. Within 18 months after receipt of this report by the Owner, any appropriate remedial work should be completed.

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

BRADLEY LAKE DAM, NY 00755

PHASE I INSPECTION REPORT

TABLE OF CONTENTS

APPENDICES

TABLES

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No.:	NY 00755
Name of Dam:	Bradley Lake Dam
State Located:	New York
County:	Rensselaer
Municipality:	City of Troy
Watershed:	Lower Hudson River Basin
Stream:	Piscawan Kill
Date of Inspection:	May 6, 1981

ASSESSMENT

Examination of available documents and visual inspection of the dam did not reveal conditions which constitute an immediate hazard to human life or property. However, the dam has some serious deficiencies which require further investigation and remedial work.

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 13% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

The classification of "unsafe" applied to a dam because of a seriously inadequate spillway is not meant to connote the same degree of emergency as would be associated with an "unsafe" classification applied for a structural deficiency. It does mean that there appears to be a serious deficiency in spillway capacity and if a severe storm were to occur, overtopping and failure of the dam could take place, significantly increasing the hazard to loss of life downstream of the dam.

Therefore, it is recommended that within 3 months after receipt of this report by the Owner, a detailed hydrologic and hydraulic analysis be started to better assess spillway capacity. This should include a more accurate determination of the site specific characteristics of the watershed. Within 18 months after receipt of this report by the Owner, any appropriate remedial work should be completed.

The detailed analysis and the design and construction observation of any remedial work should be done by a qualified, registered professional engineer.

In the meantime, the Owner should immediately institute a program to visually inspect the dam and its appurtenances at least once a month. Also, within 3 months after receipt of this report the Owner should complete development of a surveillance program for use during periods of heavy runoff and of an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

The downstream slope of the dam is about 1.6H:1V, which is considerably steeper than that of similar dams designed in accordance with modern standards of practice. Therefore, it is recommended that a stability investigation of the embankment, with particular attention to the steepness of the downstream slope, be started within 3 months after receipt of this report by the Owner. Any necessary remedial work should be completed within 18 months after receipt of this report by the Owner. The investigation and the design and construction observation of any remedial work should be done by a qualified, registered professional engineer.

Because of other deficiencies, the following additional investigations should be started within 3 months after receipt of this report by the Owner. The investigations should be performed by a qualified, registered professional engineer.

1) Investigate the apparent cracking and structural deterioration of the pipe chamber and headwall at the downstream toe and determine how repairs should be made.

2) Investigate the structural deterioration of and leakage into the auxiliary spillway drop inlet structure and outlet conduit and determine how repairs should be made. Major modifications to increase spillway capacity may be required depending on the results of the detailed hydrologic and hydraulic analysis.

Any remedial work deemed necessary as a result of these investigations should be completed within 18 months after receipt of this report by the Owner. A qualified, registered professional engineer should design and observe the construction of any necessary remedial work.

3862 The following remedial work should be completed by the Owner within 12 months after his receipt of this report. Where engineering assistance is indicated, the Owner should engage a qualified, registered professional engineer. Assistance by such an engineer may also be useful for some of the other work.

1) Remove the large tree growing on top of the outlet end of the service spillway culvert.

2) Dewater and clean the pipe chamber at the toe of the dam and restore the low level outlets to operation. The low level outlet valves should be exercised regularly.

3) Temporarily repair the structural deterioration of the inlet and outlet ends of the service spillway culvert to the extent necessary to halt further deterioration and to allow the adjacent embankment erosion to be repaired. Major permanent repair or modification of the culvert spillway, as well as repair of minor problems along the barrel of the culvert, can wait until the need for additional spillway capacity has been fully evaluated by the detailed hydrologic and hydraulic analysis.

4) Remove trees, stumps, and their root systems from all surfaces of the embankment and for 50 feet downstream of the toe in accordance with specifications and field observation of the work by an engineer. Backfilling the zones where stumps and roots have been removed should be done with proper material and procedures. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

5) Repair the erosion on the upstream slope of the dam, including that around the inlet end of the service spillway culvert, and next to the outlet end of the service spillway culvert, all in accordance with design and field observation of the work by an engineer.

6) Construct erosion protection for the entire upstream slope of the embankment in accordance with design and field observation of the work by an engineer.

7) Develop and implement effective routine operation and maintenance procedures for the dam and its appurtenances.

8) Institute a program of comprehensive technical inspection of the dam and its appurtenances by an engineer on a periodic basis of at least once every two years.

457

& LAND SURVEYOR

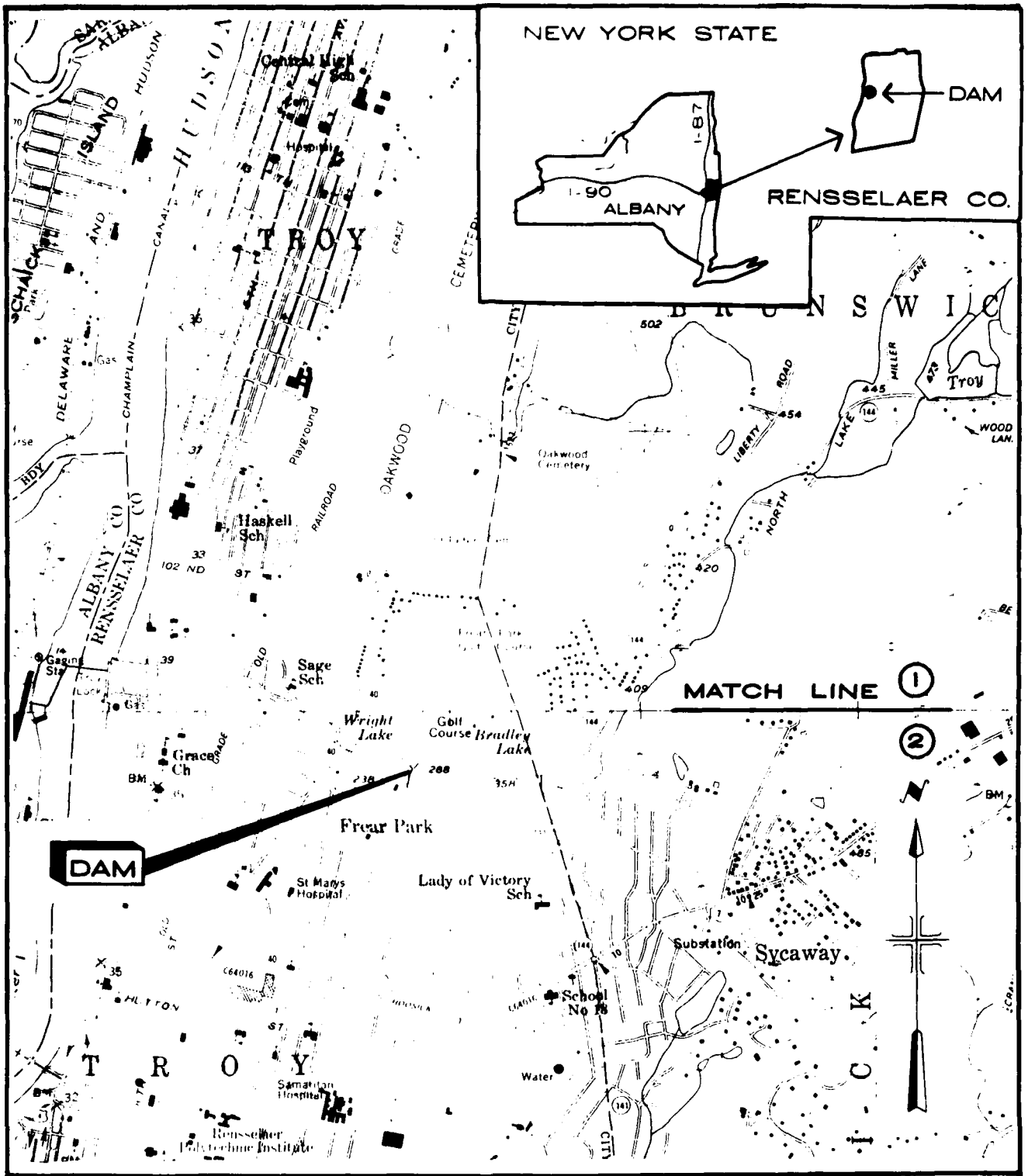
Approved by:

Kenneth J. Male
President
C. T. Male Associates, P.C.
NY PE 25004

Col. W. M. Smith, Jr.
New York District Engineer
Corps of Engineers

Date: 13 Aug 81

Overview Photo - Bradley Lake Dam. Pipe chamber for low level outlets is at left in photo and downstream end of culvert service spillway is at right - 5/6/81



SCALE OF FEET
0 2000 4000

BASE MAP: NYS-DOT PLANIMETRIC QUADS., 7.5 MIN.
(1)- NORTH TROY, 1974
(2)- SOUTH TROY, 1974

PROJECT NO. 58.01.011/80.851

ix

BRADLEY LAKE DAM
VICINITY MAP

CITY OF TROY	RENSSELAER CO., NY
SCALE 1" = 2000'	DATE JANUARY 1981

C.T. MALE ASSOCIATES, P.C.
1000 TROY ROAD SCHENECTADY N.Y. 12309

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

NAME OF DAM: BRADLEY LAKE DAM, ID NO. NY 00755

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority

The National Dam Inspection Act, Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New York District of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within New York State. C. T. Male Associates, P.C. has been retained by the New York District to inspect and report on selected dams in the State of New York. Authorization and notice to proceed was issued to C. T. Male Associates, P.C. under a letter from Michael A. Jezior, LTC, Corps of Engineers. Contract No. DACW51-81-C-0014 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection

The purpose of the inspection program is to perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public, and thus permit correction in a timely manner by non-Federal interests.

1.2 DESCRIPTION OF PROJECT

a. Location

The dam is located on the Piscawan Kill, a tributary of the Hudson River, in the City of Troy. The dam at its maximum section is at Latitude 42 degrees - 44.9 minutes North, Longitude 73 degrees - 40.1 minutes West.

Access to the dam is from State Route 7 (Hoosick Street) to the south, then via 18th Street north to Frear Park and the dam (see Vicinity Map).

The official name of the dam is Bradley Lake Dam, and the official name of the impoundment is Bradley Lake. The impoundment has also been known as Middle Service Reservoir, Old Reservoir Number Three, and Upper Oakwood Reservoir.

b. Description of Dam and Appurtenances

Bradley Lake Dam is an earthen embankment about 50 feet high, 530 feet long, and 13 feet wide at the crest. On the crest of the dam there is a paved path, 9 feet wide, which is used by golfers who play on the golf course that lies north of Bradley Lake. The dam has a bend point downstream at about its midpoint (Sta 2+30). The upstream and downstream slopes of the dam are about 3.5H:1V and 1.6H:1V, respectively. The engineer who designed the dam reported that it was founded on "alternate strata of indurated clay-shale and compact lime-stone" and that the embankment consisted of "clay, gravel, and loam" with an impervious core consisting of "puddle". The bottoms of the spillway discharge channels are bedrock and about 5 feet of soil overlying the bedrock is exposed in the sides of the channels.

The dam has two spillways, a culvert service spillway and a drop inlet auxiliary spillway. The service spillway, located about at the bend point, is a brick culvert about 4 feet wide by 5.5 feet high by about 80 feet long. The culvert is constructed of brick masonry 2 courses thick, bends to the right as it passes through the dam, and has an estimated slope downstream of 5%. The downstream end of the culvert is founded on bedrock. Flow into the culvert is over a concrete sill on the right side of the exposed portion of the culvert on the upstream slope of the dam.

The drop inlet auxiliary spillway is part of a brick masonry control tower for the dam located near the left abutment about 15 feet upstream from the dam. The drop inlet has a 3-foot by 12-foot rectangular clear opening, with an total weir length of 30 feet. At the bottom of the drop inlet shaft there is about a 6-foot-diameter outlet conduit that runs through the dam. The outlet conduit is constructed of brick masonry three courses thick, is about 150 feet long, and has a bottom slope of about 2%.

On the upstream side of the control tower there are 2 slide gates (presently inoperable) to a valve chamber (presently filled in) just upstream of the drop inlet. A 20-inch diameter valved cast iron pipe exits from the chamber, runs through the bottom of the drop inlet structure, and then is laid in the bottom of and discharges into the upstream end of the outlet conduit from the drop inlet.

28(3 At the toe of the dam there is brick and stone masonry arched-roof pipe chamber, 9 feet high by 8 feet wide. This chamber extends into the embankment about 16 feet and has a stone masonry headwall, with an access doorway, at the toe of the dam. Protruding from a brick masonry wall at the upstream end of the chamber are 3 valved cast iron pipes, two 12 inches in diameter and one 8 inches in diameter. These three pipes are the low level outlets for the dam.

c. Size Classification

In accordance with Recommended Guidelines (Reference 1), Bradley Lake Dam is classified as "intermediate" in size because its height is about 50 feet (within the 40 to 100-foot range). The maximum storage capacity of the reservoir at the top of dam is 215 acre-feet.

d. Hazard Classification

In accordance with Recommended Guidelines (Reference 1), Bradley Lake Dam is classified as having a "high" hazard potential. This is because it is judged that failure of the dam would significantly increase flows downstream which could cause loss of more than a few human lives and excessive property damage. Downstream development that could be damaged or destroyed by a dam failure includes: another dam, Wright Lake Dam, about 1000 feet downstream and Oakwood Avenue (State Route 40) which runs along the top of Wright Lake Dam; and a residential area of the City of Troy, with many dwellings, about 3000 feet downstream of the dam (vertical drop from the dam to this residential area is about 240 feet). Wright Lake Dam, NY 00757, is covered by a separate Phase I Inspection Report.

e. Ownership

The dam was originally constructed in about 1860 by the City of Troy. The dam and reservoir are presently owned by:

City of Troy
City Hall
Monument Square
Troy, New York 12180

Attn: Mr. John P. Buckley, City Manager
(518) 270-4401

f. Operator

No one is responsible for the day-to-day operation of the dam. The dam appurtenances have not been operated for many years. Operation of the dam when it was used was the responsibility of:

523

City of Troy
Department of Public Utilities
55 Leversee Road
Troy, New York 12182

Attn: Richard W. Casey, Commissioner
(518) 270-4500

g. Purpose of Dam

The dam was originally constructed to impound water for use as a public water supply for the City of Troy. It was abandoned as a water supply in 1916. The lake is presently used for recreational (aesthetic) purposes and is now part of Frear Park in Troy.

h. Design and Construction History

The dam was designed in 1859 by Barton and Fuller Engineers. It was constructed in 1859 and 1860 by an unknown contractor. The construction included the pipe chamber with low level outlets and the culvert service spillway.

In 1870 a drop inlet auxiliary spillway, valve chamber, gate house, 20-inch-diameter outlet pipe, and about a 6-foot-diameter brick masonry and wooden auxiliary spillway outlet conduit were added to the dam. In 1884 the wooden portion of the spillway outlet conduit was replaced with a 6-foot-diameter brick masonry conduit. Sometime in the mid-1960's the Owner burned the wooden gate house over the valve chamber. In 1977 a trash rack (chain link fence) was placed over the top of the drop inlet. In 1980 the golf cart path on the dam crest was paved.

There is no knowledge or record of other construction, modification, or major repair of the dam. Refer to Section 2 of this report, as well as to the Engineering Data Checklist in Appendix F2, for a complete discussion of the design and construction history. Other engineering data is included in Appendices F3 and G.

i. Normal Operating Procedures

The dam has not been operated in many years. All of the slide gates on the valve chamber and the valve on the 20-inch pipe in the valve chamber are in a state of disrepair (chamber filled with dirt and debris) and are believed to be inoperable. All 3 valves on the low level outlets in the pipe chamber (vault at toe of dam) also appear to be inoperable. At the present time, and as the normal condition, all valves and slide gates at the dam are closed and the water level is about at the culvert service spillway crest.

1.2 PERTINENT DATA

6539

a.	Drainage Area (square miles)	2.70
b.	Discharge at Dam Site (cfs)	
	Culvert Service Spillway (W.S. at top of dam)	160
	Drop Inlet Auxiliary Spillway (W.S. at top of dam)	520
	Total Both Spillways (W.S. at top of dam)	680

Following outlets are normally closed and presently inoperable - estimated potential w/W.S. at service spillway crest:

Outlet Pipe from Valve Chamber	10
Low Level Outlets	60
Maximum Known Flood (estimated based on overtopping reported to have occurred sometime previous to December 1970)	700

c. Elevation (feet - NGVD)

Based on USGS mapping, the elevation base used on the bathymetric map of the reservoir, dated June 1894 (see Appendix G-1) is about 1.2 feet lower than NGVD (National Geodetic Vertical Datum of 1929). Therefore, all elevations used in this report are 1.2 feet higher than those found on the bathymetric map in Appendix G and are in feet above mean sea level NGVD.

Top of Dam	293.3
Design High Water	Unknown
Drop Inlet Auxiliary Spillway Crest	290.3
Culvert Service Spillway Crest (Sill Crest)	288
Entrance Invert of Outlets	
Outlet Pipe from Valve Chamber	275 ±
Low Level Outlets	247 ±

d. Reservoir Length (feet) - at service spillway crest 1300 ±

e. Reservoir Surface Area (acres)

Top of Dam	12 ±
Drop Inlet Auxiliary Spillway Crest	10 ±
Culvert Service Spillway Crest	8.3

753 f. Reservoir Storage (acre-feet)

Top of Dam	215
Drop Inlet Auxiliary Spillway Crest	186
Culvert Service Spillway Crest	163

g. Dam

Type - Earth embankment with impervious core.
Length - About 530 feet.
Height - About 50 feet.
Top Width - About 13 feet (paved path is 9 feet wide).
Side Slopes - Upstream - About 3.5H:1V, original design 2H:1V.
- Downstream - About 1.6H:1V, original design 1.5H:1V.
Zoning - Unknown.
Impervious Core - Puddle wall consisting of "one part good gravel to two parts good clay"; 15 feet wide at base of dam stepping down to 8 feet wide at top of wall, which is about 3 feet higher than the service spillway crest.

Cutoff - Impervious core extends 6 feet into bedrock in a 15-foot-wide excavated trench. Three additional cutoff trenches, each 4 feet wide and 3 feet deep, excavated into bedrock and backfilled w/ puddle material which was brought up about 5 feet above bedrock into the embankment, located respectively 10 feet upstream and 18 and 36 feet downstream of the impervious core.

Grout Curtain - Unknown.

h. Spillway

1) Service Spillway

Type - Culvert spillway. Consists of about an 80-foot-long brick masonry culvert with an oval cross section 4 feet wide by 5.5 feet high. The conduit walls are 2 brick courses thick and the culvert entrance is about a 6-foot-long by 4-foot high opening in the side of the upstream end over a concrete sill.

Length of Weir - N/A (culvert cross section is control section).

Upstream Channel - Reservoir bottom tapers up to concrete sill in culvert situated on upstream slope of dam.

Downstream Channel - Bedrock channel sloping steeply from exposed end of culvert down to Wright Lake below.

2) Auxiliary Spillway

Type - Drop inlet spillway. Consists of a 3-foot by 12-foot rectangular clear opening and vertical shaft with about a 6-foot-diameter brick masonry outlet conduit from the bottom of the shaft. The conduit walls are 3 brick courses thick and the conduit is about 150 feet long.

Length of Weir - 30 feet.

Upstream Channel - Reservoir all around drop inlet.

Downstream Channel - Bedrock channel, then area of natural ground down to Wright Lake.

i. Outlet Works

1) Outlet Pipe from Valve Chamber

Size - 20-inch diameter.

Description - Cast iron pipe from valve chamber on u/s side of drop inlet auxiliary spillway, through bottom of drop inlet, and laid in bottom of and discharging into outlet conduit from drop inlet.

57

Control - 20-inch valve on u/s end inside valve chamber and two slide gates on u/s side of valve chamber. Operating stems for the valve and gates are broken or cut off, the valve chamber is filled in with earth and debris, and the valve and gates are inoperable.

2) Low Level Outlets

Size - Two 12-inch diameter and one 8-inch diameter.
Description - 3 cast iron pipes about 140 feet long under dam to pipe chamber at toe of dam.
Control - Valves on d/s end of each pipe in pipe chamber, all believed to be inoperable.
Other - The brick and stone masonry arched-roof pipe chamber is 8 feet wide by 9 feet high (presently silted in 2 feet) by 16 feet long. At the downstream end there is a 3-foot by 6-foot doorway for access to the chamber.

SECTION 2

ENGINEERING DATA

2.1 DESIGN DATA

a. Geology

Very little geologic information was available in the design data for this dam. The following information was obtained from current geologic maps and publications for this region (References 26, 27, and 28), as well as from the site visit.

Bradley Lake Dam is located on the western border of the Taconic Section of the New England Province. Regional geologic bedrock maps show that between Bradley Lake Dam and Wright Lake Dam, which is immediately downstream, there is a thrust or reverse fault which trends north-south (roughly perpendicular to the east-west trend of the valley) and another fault, trending northeastward, and shown on the map as being immediately downstream of Bradley Lake Dam. The map indicates that the bedrock under Bradley Lake Dam is the German-Town Formation which is of Cambrian age and consists of shale and conglomeratic limestone. Surficial geology maps indicate that the overburden soils at the dam site consist of the blue-gray and choc-olate rhythmic clays known as the Lake Albany clays.

In excerpts from the Water Commissioners Report of 1860 concerning the construction of the dam (see Appendix F3-2), the bedrock under the dam is described as "alternating strata of in-durated clay-shale and compact lime-stone ... bent and corrugated at sharp angles".

b. Subsurface Investigations

No records of subsurface investigations are available for this dam site.

c. Dam and Appurtenances

The dam was designed in 1859 by Barton and Fuller Engineers, who are no longer in business. The only records available concerning the design of the dam were excerpts from City of Troy Water Commis-sioners Reports (see Appendices F3-1 to F3-8). Also available was a bathymetric map of the reservoir done in June 1894 (see Appendix G-1).

2.2 CONSTRUCTION HISTORY

a. Initial Construction

Bradley Lake Dam was constructed from September 1859 to July 1860 according to the City of Troy Water Commissioners Report of 1861 (see Appendices F3-4 and F3-5). The Water Com-

missioners Reports describe the construction of the original dam and indicate that the only spillway at that time was the oval culvert spillway, or "waste-weir" as it was referred to in the Reports. The construction contractor for the dam is unknown.

No drawings or other data concerned with the original construction could be found. A brief review of the known construction history, as can be determined from the available data and the Owner, can be found on Appendix F2-2.

b. Modifications, Repairs, and Maintenance

Excerpts from City of Troy Water Commissioners Reports (see Appendices F3-7 and F3-8) describe some early modifications to the dam. In 1870 a drop inlet spillway, valve chamber, gate house, and about 144 feet of 6-foot-wide by 6.5-foot-high oval brick masonry outlet conduit were added to the dam. From the end of the brick masonry conduit a wooden conduit was built about 220 feet down to Wright Lake, a downstream reservoir. A 20-inch-diameter valved cast iron pipe also was installed from the valve chamber and extended about 75 feet inside the outlet conduit before turning and exiting the conduit.

In 1884 the wooden portion of the drop inlet outlet conduit was replaced with a brick masonry conduit that had a limestone headwall at its downstream end. The area around the conduit was then backfilled. The headwall still exists and is visible in Photo A-11B. Present observation, as illustrated by this same Photo A-11B, suggests that the lower portion of the brick masonry outlet conduit must have been replaced at some later time with two riveted steel pipes, and that these steel pipes subsequently deteriorated and were abandoned.

According to the Owner the wooden gate house over the drop inlet and valve chamber was burned down in the mid-1960's by the City. Photos on Appendix F3-13 show the gate house as it existed in 1921.

In 1977 a trash rack of 2 by 4 lumber and chain link fence was placed over the top of the drop inlet.

In 1980 the golf cart path on the top of the dam was paved.

c. Pending Remedial Work

There are no known plans for any remedial work at the dam.

2.3 OPERATION RECORD

a. Inspections

There is no known record of inspection of the dam by the Owner.

A State of New York Conservation Commission Dam Report dated June 20, 1921 (see Appendix F3-9) describes the dam as "in good condition". On Appendix F3-13 are photos of the dam from upstream taken during this inspection.

An inspection report dated December 8, 1970 by the NYS-DEC and various correspondence concerning that inspection (see Appendices F3-14 to F3-21) indicated that the dam was in a deteriorated and unsafe, but repairable condition. The presence of tree growth on the downstream slope of the dam was noted. The 1970 inspection indicated that the crest of the dam was eroding, and a report of February 4, 1971 concerning the 1970 inspection stated that "the earth embankment shows evidence of previous high water and erosion due to overtopping" (see Appendix F3-17). The spillway structures were also described as deteriorating and it was noted that the drop inlet structure had no protection over the opening. Finally the inspection noted that there was evidence of some maintenance being performed at the dam site.

An inspection report dated December 19, 1974 by the NYS-DEC (see Appendix F3-22) indicated that the spillways were "in need of repair or maintenance" and that a trash rack should be provided for the spillway. The report also noted that "repairs (were) required beyond normal maintenance".

An inspection report dated April 28, 1978 by the NYS-DEC (see Appendix F3-24) and a letter sent to the Owner concerning that inspection (see Appendix F3-25) indicated that the dam's spillways were "in need of repair or maintenance". The dam was also evaluated as needing "repairs required beyond normal maintenance."

b. Performance Observations

Other than the observations made in the various data, inspections, and correspondence concerning the dam (see Appendix F3) there are no other records of performance observations.

c. Water Levels and Discharges

There are no known records of water levels or discharges at the dam.

025 d. Past Floods and Previous Failures

The City of Troy Water Commissioners Reports (see Appendix F3-6) indicate that in February 1861 water flowed out of the reservoir over ground on the left side of the dam. When this occurred the only spillway at the dam was the oval culvert spillway and all three of the low level outlet pipes were open.

A report for the inspection made on December 8, 1970 (see Appendix F3-17) states that "the embankment shows evidence of pre-

vious high water and erosion due to overtopping". There is no other information in the available records as to the extent of the overtopping and crest erosion.

2.4 EVALUATION

a. Availability

As listed on Appendix F1, various engineering data and records are available in the files of the Owner, the Dam Safety Section of the NYS-DEC, and the Division of Fish and Wildlife of the NYS-DEC. This data was reviewed, and copies of the records significant to the dam are included in chronological order in Appendices F3 and G. Appendix F2, Checklist for General Engineering Data and Interview with Dam Owner, also contains pertinent engineering information. A current pamphlet entitled "History of the Troy Water Works" was also available from the Owner and was useful, but it is not appended to this report.

b. Adequacy

Available data consisted of descriptions of the dam's construction and repairs from Troy Water Commissioners Reports, inspection reports, two old photos, correspondence, and bathymetric mapping of the lake. Such data as design/construction drawings, record drawings, specifications, design calculations, detailed data on foundation and embankment soils, and operation and performance data are not available. The lack of such in-depth engineering data does not permit a comprehensive review. Therefore, the available data was not adequate by itself to permit an assessment of the dam.

c. Validity

The culvert spillway measured 4 feet by 5.5 feet high and not 4 feet by 5 feet as found in the City of Troy Water Commissioners Reports (see Appendix F3-6).

The elevation base of the bathymetric map (Appendix G-1) is about 1.2 feet lower than NGVD based on USGS mapping.

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General

Bradley Lake Dam was inspected on May 6, 1981. The inspection party (see Appendix B-1) met two representatives of the Owner at the offices of the Troy Department of Public Utilities: Richard W. Casey, Commissioner, and Neil Bonesteel. The inspection party then proceeded to the dam site, without the Owner's representatives, and performed the inspection. The weather was overcast and cool in the morning, warming toward noon. The water surface was at about EL 288.2 or about 2 inches above the sill at the inlet end of the culvert service spillway. The Visual Inspection Checklist is included as Appendix B, while selected photos taken during the inspection are included in Appendix A and as the Overview Photo at the beginning of this report. Appendix A-1 is a photo index map.

b. Dam

There is no evidence of sloughs or slides of the embankment.

Crest of Dam - There is a paved golf cart pathway on the crest of the dam (see Photo A-2A). The pavement is in good condition and shows no signs of settlement, cracking, or horizontal movement.

Upstream Slope of Dam - The upstream slope has a sparse cover of weeds and grass. Brush growing on the upstream slope between the service spillway and the right abutment appears to have been cut within the past year or two. Significant erosion of the upstream slope has occurred near its contact with the left abutment (see Photo A-3A) and next to the service spillway culvert (see Photos A-3B and A-4A). A small clump of trees is growing on the upstream slope near the right abutment. There is no erosion protection on the portion of the slope which is visible above the reservoir level (see Photo A-4B).

Downstream Slope of Dam - The downstream slope of the dam is 1.6H:1V, which, for a dam of this height (about 50 feet), is considerably steeper than that of similar dams designed in accordance with modern standards of practice. No evidence of creep or sloughing was observed on the slope, but there does appear to be an inactive erosion channel near the top of the slope at about Station 3+60. The downstream slope is covered with unmowed grass and weeds from the left abutment to about Station 2+00,

with brush from about Station 2+00 to Station 2+50, and with trees, stumps, logs and brush from Station 2+50 to the right abutment (see Photos A-5B and A-6A). At about Station 0+75 there is a large stump on the downstream slope about 3 feet below the elevation of the top of the dam. No evidence of seepage, wetness, or softness was observed.

Zone Next to Downstream Toe - Between the left abutment and the service spillway there is a grass- and brush-covered terrace (see Photo A-2B) which is about 10 feet below the elevation of the top of the dam. Between the service spillway and the right abutment is the deep section of the valley. Trees are growing in this section between the toe of the dam and Wright Lake which is immediately downstream. There is no evidence of seepage in the zone next to the downstream toe. Flow from the service spillway discharges in a channel on the left bank of the deep valley section (see Overview Photo). The bottom of this channel is bedrock. Flow from the auxiliary spillway near the left abutment discharges down a channel on the natural valley slope downstream of the terrace next to the dam (see Photo A-11A). The bottom of this channel is also bedrock.

Abutments - Both abutments appear to be soil. No bedrock outcrops were observed in the vicinity of the abutments.

c. Appurtenant Structures

1) Pipe Chamber and Low Level Outlets

At the toe of the dam there is a brick and stone masonry headwall at the downstream end of a brick and stone masonry pipe chamber (see Overview Photo). Inside the pipe chamber are the valved ends of the 3 low level outlet pipes: two 12-inch pipes and one 8-inch pipe (see Photo A-6B). The valves and exposed portions of the cast iron pipes are rusted and pitted. The valves have not been operated in many years, have no handwheels, and are believed to be inoperable.

The pipe chamber and its downstream headwall are in a deteriorated condition. There are structural cracks about one-half to one inch wide about 4 to 6 feet from the downstream end of the chamber. There are diagonal cracks in the headwall and it is being undermined at its ends. The brick and stone masonry of the chamber and headwall is deteriorating with bricks and stones loose, broken, and missing (see Photo A-6A).

2) Culvert Service Spillway and Discharge Channel

The ends of the culvert service spillway are in poor condition. There is significant erosion around the upstream end of the culvert (see Photos A-3B and A-4A). At the upstream

end of the culvert to the right of its inlet, about a 4-foot section of the culvert halfway around the pipe is missing (see Photo A-7A). About a 4-foot-square brick masonry section of the culvert, in back of the inlet, is also missing. Brick masonry around the opening is missing, worn, and broken. Concrete around and over the inlet is spalled and eroded.

A large tree is growing on top of the downstream end of the culvert service spillway and significant erosion is occurring next to the outlet end of the culvert (see Photo A-8B). The downstream end of the culvert is broken up, with stone masonry exposed on the left side, looking downstream. The exposed bricks at the downstream end are spalled, broken, and loose.

Between its ends the culvert service spillway is in fair condition (see Photo A-7B). In the bottom portion of the culvert mortar is eroded to a depth of about one inch and some bricks have spalled to half their thickness (see Photo A-8A).

The discharge channel downstream of the service spillway is a steep area over exposed bedrock that discharges into the upstream end of Wright Lake (see Overview Photo).

3) Control Tower, Auxiliary Spillway, and Discharge Channel

The control tower is a deteriorating brick masonry structure consisting of the drop inlet portion of the auxiliary spillway on the downstream side and a valve chamber on the upstream side (see Photo A-9A). The control tower crest is irregular with two to eight courses of brick missing in various places. There are structural cracks at the corners of the drop inlet shaft with leakage of as much as 50 gpm into the shaft. The valve chamber portion of the tower is filled in with earth and debris. The two slide gates on the upstream side of the valve chamber have broken or cut off operating stems and are believed to be inoperable. The chain link fencing of the trash rack over the drop inlet is ripped away from its wood frame on the right side.

The outlet conduit from the drop inlet is a round (or nearly round) brick masonry conduit with walls that appear to be three courses of brick thick. There is seepage into the conduit upstream of the dam crest and stalactites of calcium carbonate hang from the crown of the conduit (see Photo A-9B). The brick masonry of the conduit is in a deteriorated condition with mortar loose and missing. Bricks are spalled, broken, and loose, with whole layers of the brick lining missing. Some patching of the conduit, with concrete blocks and cement, has been done (see
7310 Photo A-10A). The patch shown in Photo A-10A may have been where the 20-inch outlet pipe in the bottom of the outlet conduit used to exit from the outlet conduit.

The brick masonry at the downstream end of the conduit is irregular (see Photo A-10B). Reportedly the brick conduit once extended from its present end downstream to a limestone headwall at Wright Lake (see Section 2.2b). Presently this area is just an open channel from the end of the conduit down to Wright Lake. At its upstream end the channel from the conduit is steep exposed bedrock (see Photo A-11A). Further downstream the channel is an eroded area of soil. The channel in this area is clogged with brush, trees, concrete debris, old sections of riveted steel pipe, and an old stone headwall (see Photo A-11B).

A 20-inch-diameter cast iron pipe extends from the valve chamber into the upstream end of the spillway outlet conduit (see Photo A-9B). The upstream control valve on this pipe is buried by the earth and debris filling the valve chamber. A stem, possibly for the valve, extends from the debris but the valve appears to be inoperable. The pipe is broken at its downstream end inside the outlet conduit.

d. Reservoir Area

No evidence was observed to indicate problems of slope instability on the perimeter of the reservoir or of significant sedimentation in the reservoir (see Photo A-12B).

e. Downstream Channel

Both spillway discharge channels and any flow from the low level outlets discharge into the upstream end of Wright Lake (see Photo A-12A).

3.2 EVALUATION

Significant erosion of the upstream slope of the dam next to the service spillway and near the left abutment, if allowed to continue, could lead to breaching of the dam. Also, there is significant structural deterioration of the upstream end of the service spillway culvert. The lack of erosion protection on the upstream slope could lead to the initiation of erosion at other locations as well.

The brick masonry drop inlet and outlet conduit of the auxiliary spillway are badly deteriorated. A structural collapse of the drop inlet or outlet conduit, with the resultant blockage of the spillway, could lead to overtopping and breaching of the dam.

Trees growing on the upstream slope near the right abutment, on the downstream slope between the service spillway and the right abutment, and in the zone next to the downstream toe of the dam could lead to seepage problems and piping (internal erosion) of the embankment if any of the trees blow over and pull out their

roots or if any of the trees die and their roots rot. Similar seepage problems could result from the stumps on the downstream slope of the dam.

The downstream slope of the dam is steeper than that of similar dams designed in accordance with modern standards of practice and should be evaluated to determine whether it has an adequate factor of safety against failure.

A large tree growing on top of the outlet end of the service spillway culvert may result in structural collapse of the culvert and blockage of the spillway, which could, in turn, lead to overtopping and breaching of the dam. Significant erosion of the soil around the outlet end of the service spillway culvert, if allowed to continue, could lead to erosion of the embankment and breaching of the dam.

A structural collapse of the pipe chamber or headwall at the toe of the dam, due to their deteriorated condition, could threaten the stability of the embankment.

The low level outlet pipe valves are in poor condition and appear to be inoperable. This makes it difficult to regulate lake levels or drain the lake.

Unmowed grass and weeds and brush made it impossible to inspect adequately the downstream slope and the zone next to the downstream toe of the dam.

SECTION 4

OPERATION AND MAINTENANCE PROCEDURES

4.1 OPERATION PROCEDURES

There are no operation procedures, written or otherwise, for the dam.

Bradley Lake is presently just used for recreational (aesthetic) purposes. The water level is normally at or below the service spillway crest. The gates on the upstream side of the valve chamber, the valve on the 20-inch pipe from the valve chamber, and the valves on the 3 low level outlets in the pipe chamber at the toe of the dam are all normally closed and have not been operated in many years.

At the time of the May 6, 1981 inspection the lake level was about 2 inches above the service spillway crest.

4.2 MAINTENANCE OF DAM AND OPERATING FACILITIES

There are no written maintenance procedures for the dam.

The use of Bradley Lake as a source of water supply by the City of Troy was discontinued in 1916. The operating facilities at the dam are presently in a state of disrepair, appear to be inoperable, and have not been used in many years.

The only regular maintenance performed on the dam is the cutting of brush on the upstream slope and the maintenance of the golf cart path across the top of the dam by the City of Troy Department of Parks and Recreation. No other regular repairs or periodic maintenance of the dam or appurtenances occurs.

4.3 EMERGENCY ACTION PLAN AND WARNING SYSTEM

There is no emergency action plan and warning system for the dam.

4.4 EVALUATION

Maintenance of the dam and appurtenances is unsatisfactory. There has been no significant maintenance or repair of the dam and its appurtenances in recent years. Effective operation and maintenance procedures, as well as plans for repairs, need to be developed and implemented in order to avoid the continued deterioration of the dam.

The Owner should develop an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

SECTION 5

HYDROLOGY AND HYDRAULICS

5.1 DRAINAGE AREA CHARACTERISTICS

Bradley Lake Dam and Bradley Lake are located on the Piscawan Kill, a tributary of the Hudson River in eastern New York. Immediately downstream of the dam the Piscawan Kill discharges into Wright Lake. The dam itself is located less than one mile upstream from the tributary's confluence with the Hudson River.

The total drainage area at the dam is 2.70 square-miles, of which about 0.013 square-miles (8.3 acres), or only about five-tenths of one percent, is the surface of Bradley Lake at its service spillway crest. The topography of the drainage area is characterized by slopes of 10% to 20%. Elevations in the drainage area vary from EL 288 to EL 1190. (See Appendices C-5 and C-6).

About 2 miles upstream of the dam there is a major impoundment known as Troy Reservoir (about 52 acres). Since Troy Reservoir has a total drainage area of 1.58 square-miles, it regulates about 59% of the total drainage area of Bradley Lake Dam. Troy Reservoir is actually two impoundments that act as one because they are connected by two large uncontrolled culverts under the earth berm that separates them. The berm is known as Brunswick Reservoir Dam, NY 00114, and the lower or main dam is Vanderheyden Reservoir Dam, NY 00116. There is no Phase I Inspection Report for either of these dams.

5.2 ANALYSIS CRITERIA

The U.S. Army Corps of Engineers Hydrologic Engineering Center's Program HEC-1 DB (Reference 3) was used to develop the test flood hydrology and perform the reservoir routing.

The purpose of this analysis was to evaluate the dam and spillway with respect to their surcharge storage and spillway capacity. Accordingly, it was assumed that the water surface was at the service spillway crest at the start of the flood routing. Outflow from the reservoir was allowed only through the service and auxiliary spillways. The gates into the bottom of the valve chamber and the outlet pipe from the valve chamber, as well as the low level outlets, were all assumed to be closed, as they are normally. All these outlets are presently inoperable anyway.

A constant base flow of 2 cfs per square mile was chosen to represent average conditions in the drainage area and was inputted into the program for all subareas.

The index PMP (probable maximum precipitation) inputted to the HEC-1 DB program was 19.5 inches for a 24-hour duration all-season storm over a 200-square-mile basin, according to HMR 33 (Reference 4). Maximum 6-hour, 12-hour, 24-hour, and 48-hour precipitation for the actual size of the drainage area (same for 10 square miles or less) were inputted to the program as percentages of the index PMP in accordance with HMR 33. A storm reduction coefficient was then applied internally by the program in order to transpose or center the storm over the actual total drainage area. Thus, the corrected 48-hour PMP for the actual total drainage area became 22.2 inches. All rainfall was distributed using the Standard Project Storm arrangement embedded in the program.

Appendices C-7 and C-8 summarize the subarea, loss rate, and unit hydrograph data inputted to the program. Four subareas were used. Subarea 1 consists of all the drainage area around Troy Reservoir, and Subarea 2 consists of just the surface of Troy Reservoir. Subarea 3 consists of all the drainage area tributary to Bradley Lake, excluding Subareas 1 and 2. Subarea 4 consists of the surface of Bradley Lake. For the land in Subareas 1 and 3, loss rates were assumed to be 1.0 inch initially and a constant 0.1 inch per hour thereafter. A Snyder unit hydrograph basin coefficient was assumed for average conditions and a Snyder peaking coefficient was chosen from the 1976 Upper Hudson and Mohawk River Basins Hydrologic Flood Routing Models (Reference 20). A conservative standard lag time was computed. The program uses the inputted lag time and Snyder peaking coefficient to solve by iteration for approximate Clark coefficients, which are then used to calculate the runoff hydrograph.

For the reservoir surfaces making up Subareas 2 and 4, loss rates were set to zero so that rainfall would equal rainfall excess, or runoff. Assuming no delay in the rainfall/runoff response, a constant unit hydrograph for a rainfall duration equal to the HEC-1 DB calculation interval was developed per Appendices C-7 and C-8 and inputted to the program for each reservoir.

Flows were routed through Subarea 2, Troy Reservoir, using the HEC-1 DB program in the same way as for Bradley Lake. The development of elevation-storage and discharge data for Troy Reservoir is shown on Appendices C-9 and C-10. Routing was started with the water surface at the spillway crest and the outlet works were assumed to be closed. The spillway and the top of the dam were modeled as ideal broad-crested weirs.

Flow from Troy Reservoir was routed through Subarea 3 to Bradley Lake by the HEC-1 DB program using normal depth channel routing. The inputted typical cross sections defining the channel reaches were developed from and are located on the Drainage Area Map, Appendix C-5. Hand plottings of the cross sections are included as Appendices C-11 and C-12.

The floods selected for analysis were the PMF (probable maximum flood) and 1/2 PMF. Floods as ratios of the PMF (e.g., 1/2 PMF) were taken as ratios of runoff, not of precipitation. Peak inflow to Bradley Lake for the PMF is about 5,400 cfs, or 2,000 csm (cfs per square mile). Peak outflow is not reduced by reservoir routing and is the same as peak inflow. For 1/2 PMF the peak inflow is about 2,300 cfs (852 csm) and the routed peak outflow is the same as inflow.

5.3 RESERVOIR CAPACITY

Using a bathymetric map of the reservoir (see Appendix G-1), supplemented by USGS contour mapping above the service spillway crest (see Appendix C-5), areas inside contour elevations were measured and the capacity of the reservoir was computed by the method of conic sections. The computations were done by the HEC-1 DB program. A hand tabulation of the elevation-area input and the computed results is on Appendix C-13.

At the culvert service spillway crest, EL 288, the reservoir has a capacity of 163 acre-feet. At the top of dam, EL 293.3, the reservoir has a capacity of 215 acre-feet. Surcharge storage between the service spillway crest and the top of dam amounts to 52 acre-feet, or only about 0.4 of an inch of runoff from the total 2.70-square-mile drainage area. Therefore, the reservoir has little capacity to attenuate peak inflow.

5.4 SPILLWAY CAPACITY

The dam has a culvert service spillway with a 4-foot-wide by 5.5-foot-high oval cross section. The dam also has a drop inlet auxiliary spillway, with a total weir length of 30 feet, followed by about a 6-foot-diameter outlet conduit.

The discharge capacity for the service spillway was liberally computed assuming critical flow through the culvert inlet when it was flowing partially full. When the service spillway inlet was flowing full, it was assumed to act like an orifice with free discharge. The service spillway discharge computations are presented on Appendix C-14. With water 5.3 feet over the service spillway crest (i.e., water level at top of dam), the service spillway discharges about 160 cfs.

The discharge capacity of the auxiliary spillway was calculated assuming that the drop inlet entrance acted as a sharp-crested weir up to the top of dam, EL 293.3. Above the top of dam flow through the auxiliary spillway is controlled by the outlet conduit from the drop inlet. The auxiliary spillway discharge computations are presented on Appendices C-15 and C-16. With water 3 feet over the auxiliary spillway crest (i.e., water level at top of dam), the auxiliary spillway discharges about 520 cfs.

For the service spillway crest at EL 288, the auxiliary spillway crest at EL 290.3, and the top of dam at EL 293.3, the total discharge computations are summarized on Appendix C-17. Total discharge from the dam is the sum of the discharges from the service and auxiliary spillways, plus flow over the dam for the overtopping condition. As discussed previously in Section 5.2, all of the gates into the bottom of the valve chamber and the outlet pipe from the valve chamber, as well as the low level outlets at the toe of the dam, were assumed closed, as they are normally. The sum of the hand-computed discharges for both spillways were inputted directly to the HEC-1 DB program.

With the lake level at the top of the dam, EL 293.3, the total discharge from the dam is the combined capacity of the service and auxiliary spillways, or about 680 cfs.

5.5 FLOODS OF RECORD

As noted in Section 2.3d, an NYS-DEC inspection of the dam on December 8, 1970 disclosed that the embankment showed "evidence of previous high water and erosion due to overtopping". Using the spillway capacity data developed in Section 5.4, the corresponding flood discharge required to have caused such an overtopping is estimated to have been about 700 cfs (65 csm), or only about 13% of the PMF peak outflow predicted.

5.6 OVERTOPPING POTENTIAL

The results of the overtopping analysis using the HEC-1 DB program are summarized in Table 5.1. The overtopping analysis computer input and output for the PMF and 1/2 PMF are included starting on Appendix C-18.

As noted from Table 5.1, the PMF overtops the dam by about 2.0 feet maximum with duration of overtopping of about 9.5 hours. 1/2 PMF also overtops the dam but by about 1.0 foot maximum with duration of overtopping of about 7.0 hours. Peak inflows are 5,400 cfs for the PMF and 2,300 cfs for 1/2 PMF. For both the PMF and 1/2 PMF peak outflow is not reduced by reservoir routing and is the same as peak inflow. Time to maximum stage, or the time from the start of the 48-hour storm to peak outflow, is between 42 and 43 hours for both PMF and 1/2 PMF. The peak portion of the inflow and outflow hydrographs for the PMF and 1/2 PMF are shown by the computer plots on Appendices C-28 and C-29. Total project discharge capacity at the top of dam is due to the service and auxiliary spillways (outlet works closed) and is about 680 cfs, or only about 13% of the PMF peak outflow and about 30% of the 1/2 PMF peak outflow.

It should be noted that Troy Reservoir is overtopped by both the PMF and 1/2 PMF (by 1.7 and 0.8 feet, respectively). Also peak outflows are reduced slightly by routing through Troy Reservoir

TABLE 5.1

BRADLEY LAKE DAM

OVERTOPPING ANALYSIS

CONDITIONS

Total Drainage Area = 2.70 square miles, including Troy Reservoir and its drainage area.
Start Routing at Service Spillway Crest EL 288
Top of Dam EL 293.3
Total Project Discharge Capacity at Top of Dam = 680 cfs ± due to service and auxiliary spillways. Outlet works assumed closed.
Some values rounded from computed results.

	PMF	1/2 PMF (a)
INFLOW		
48-hour Rainfall (inches)	22.2	13.0 (b)
48-hour Rainfall Excess (inches) (c)	18.5	9.3 (d)
Peak Inflow (cfs)	5,400	2,300
Peak Inflow (csm)	2,000	852
OUTFLOW		
Peak Outflow (cfs)	5,400	2,300
Peak Outflow (csm)	2,000	852
Time to Peak Outflow (hours)	42.2	43.0
Maximum Storage (acre-feet)	239	227
Max. W.S. Elevation (feet-NGVD)	295.3	294.3
Minimum Freeboard (feet)	overtopped	overtopped
Maximum Depth over Dam (feet)	2.0	1.0
Duration of Overtopping (hours)	9.5	7.0

(a) One-half of PMF total runoff, including base flow. For PMF base flow = 2 cfs per square mile = 5 cfs ± .
(b) Approximation assuming total losses are the same as for the PMF.
(c) Rainfall Excess = Rainfall for the Reservoir Surface. For the rest of the drainage area, losses are assumed to be 1.0 inch initially and 0.1 inch per hour thereafter.
(d) Equal to one-half of PMF value.

(peak inflows are about 3,300 cfs for the PMF and 1,600 cfs for the 1/2 PMF, while peak outflows are about 3,200 cfs and 1,400 cfs, respectively). These results are shown in the computer output on Appendices C-25 and C-26.

5.7 EVALUATION

Maximum spillway discharge capacity (of service and auxiliary spillways combined) is only about 13% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

73

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

The following visual observations, which are discussed in detail in Section 3, are indicative of potential long-term stability problems at Bradley Lake Dam:

1) Erosion of the upstream slope of the dam next to the service spillway and near the left abutment.

2) Trees and stumps on the downstream slope between the service spillway and the right abutment, on the upstream slope near the right abutment, and in the zone next to the downstream toe of the dam.

3) Steepness of the downstream slope.

4) A large tree growing on top of the outlet end of the service spillway culvert.

5) Erosion next to the outlet end of the service spillway culvert.

The downstream slope of the dam is about 1.6H:1V, which is considerably steeper than the downstream slope of similar dams designed in accordance with modern standards of practice. An analysis of the stability of the embankment should be made to determine whether it has an acceptable factor of safety against slope failure.

b. Design and Construction Data

The only design and construction data available were excerpts from old City of Troy Water Commissioners Reports which briefly describe the features and construction of the dam. These reports were discussed previously in Section 2 and are included as Appendices F3-1 to F3-8.

c. Operating Records

The report of an inspection made on December 8, 1970 states that "the earth embankment shows evidence of previous high water and erosion due to overtopping" (see Appendix F3-17). There is no other information in the available records as to the extent of the overtopping and crest erosion or the repairs that have apparently been made.

d. Post-Construction Changes

The only major post-construction change appears to have been the addition of the auxiliary drop inlet spillway and outlet conduit in 1870, 10 years after the dam was constructed. This modification was discussed previously in Section 2.2b.

e. Seismic Stability

This dam is in Seismic Zone 2. According to the Recommended Guidelines (Reference 1) a seismic stability analysis is not required.

6.2 STABILITY ANALYSIS

A structural stability analysis is not required because there are no gravity structures at this dam to analyze.

37

SECTION 7

ASSESSMENT AND RECOMMENDATIONS

7.1 ASSESSMENT

a. Safety

Visual inspection of Bradley Lake Dam revealed the following deficiencies which affect the safety of the dam:

1) Trees and stumps on the embankment and in the zone next to the downstream toe.

2) A downstream slope of about 1.6H:1V, which is considerably steeper than that of similar dams designed in accordance with modern standards of practice and which may not have an acceptable factor of safety against failure.

3) Significant erosion of the upstream slope of the dam next to the service spillway and left abutment, and of the downstream slope next to the outlet end of the service spillway culvert.

4) A large tree growing on top of the outlet end of the service spillway culvert.

5) Significant structural deterioration of both the inlet and outlet ends of the service spillway culvert.

6) Significant structural deterioration of and leakage into the auxiliary spillway drop inlet structure and outlet conduit.

7) Apparent cracking and structural deterioration of the pipe chamber and headwall at the downstream toe.

Hydrologic and hydraulic analysis indicates that maximum spillway discharge capacity is only about 13% of the PMF peak outflow. The 1/2 PMF would overtop the earth embankment and would probably cause failure. It is judged that failure due to overtopping would significantly increase the hazard to loss of life downstream from that which would exist just prior to failure. Therefore, in accordance with Corps of Engineers' screening criteria for review of spillway adequacy, spillway capacity is considered "seriously inadequate" and the dam is assessed as "unsafe, non-emergency".

b. Adequacy of Information

Available information together with that gathered during the visual inspection, while considered adequate for this Phase I Inspection, is deficient in the following respect: the presence of brush and unmowed grass and weeds on much of the downstream slope and in much of the zone next to the downstream toe makes it impossible to inspect those areas adequately.

c. Need for Additional Investigations

The following investigations should be performed by a registered professional engineer qualified by training and experience in the design of dams:

1) Perform a detailed hydrologic and hydraulic analysis to better assess spillway adequacy. This should include a more accurate determination of the site specific characteristics of the watershed.

2) Evaluate the stability of the embankment, with particular attention to the steepness of the downstream slope.

3) Investigate the apparent cracking and structural deterioration of the pipe chamber and headwall at the downstream toe and determine how repairs should be made.

4) Investigate the structural deterioration and leakage into the auxiliary spillway drop inlet structure and outlet conduit and determine how repairs should be made. Major modifications to increase spillway capacity may be required depending on the results of the detailed hydrologic and hydraulic analysis.

d. Urgency

As recommended below in Section 7.2a, a program to visually inspect the dam at least once a month should be instituted immediately. As recommended below in Section 7.2b, development of a surveillance program and an emergency action plan should be completed within 3 months after receipt of this Phase I Inspection Report by the Owner. While the action plan is being developed, and within 3 months after receipt of this report by the Owner, the investigations recommended above in Section 7.1c should be started.

Any remedial work deemed necessary as a result of these investigations should be completed within 18 months after receipt of this report by the Owner.

Measures recommended below in Section 7.2c should be completed within 12 months after receipt of this report by the Owner.

7.2 RECOMMENDED MEASURES

The following work should be performed by the Owner. Where engineering assistance is indicated, the Owner should engage a registered professional engineer qualified by training and experience in the design of dams. Assistance by such an engineer may also be useful for some of the other work.

a. Complete Immediately

Institute a program to visually inspect - not just casually look at - the dam and its appurtenances at least once a month.

b. Complete Within 3 Months

Develop a surveillance program for use during and immediately after heavy rainfall or snowmelt, and also an emergency action plan outlining action to be taken to minimize the downstream effects of an emergency, together with an effective warning system.

c. Complete Within 12 Months

1) Remove the large tree growing on top of the outlet end of the service spillway culvert.

2) Dewater and clean the pipe chamber at the toe of the dam and restore the low level outlets to operation. The low level outlet valves should be exercised regularly.

3) Temporarily repair the structural deterioration of the inlet and outlet ends of the service spillway culvert to the extent necessary to halt further deterioration and to allow the adjacent embankment erosion to be repaired. Major permanent repair or modification of the culvert spillway, as well as repair of minor problems along the barrel of the culvert, can wait until the need for additional spillway capacity has been fully evaluated by the detailed hydrologic and hydraulic analysis.

46

4) Remove trees, stumps, and their root systems from all surfaces of the embankment and for 50 feet downstream of the toe in accordance with specifications and field observation of the work by an engineer. Backfilling the zones where stumps and roots have been removed should be done with proper material

and procedures. Continue to keep these same areas clear by cutting, mowing, and cleanup at least annually.

5) Repair the erosion on the upstream slope of the dam, including that around the inlet end of the service spillway culvert, and next to the outlet end of the service spillway culvert, all in accordance with design and field observation of the work by an engineer.

6) Construct erosion protection for the entire upstream slope of the embankment in accordance with design and field observation of the work by an engineer.

7) Develop and implement effective routine operation and maintenance procedures for the dam and its appurtenances.

8) Institute a program of comprehensive technical inspection of the dam and its appurtenances by an engineer on a periodic basis of at least once every two years.

d. Complete Within 18 Months

The following remedial work should be completed by the Owner. A qualified, registered professional engineer should design and observe the construction of the remedial work.

1) Appropriate modifications as a result of the detailed hydrologic and hydraulic analysis.

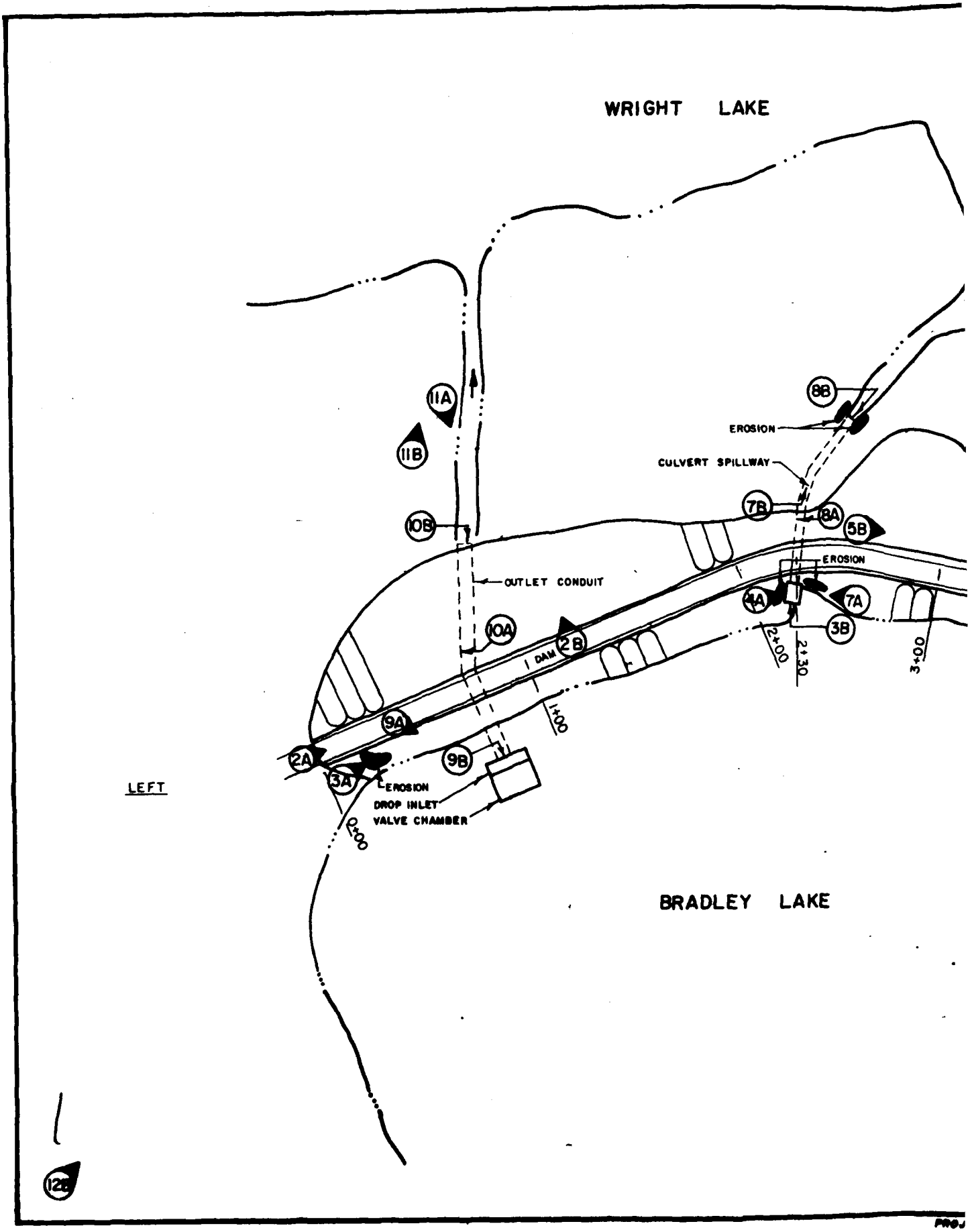
2) Appropriate modifications as a result of the stability investigation of the embankment.

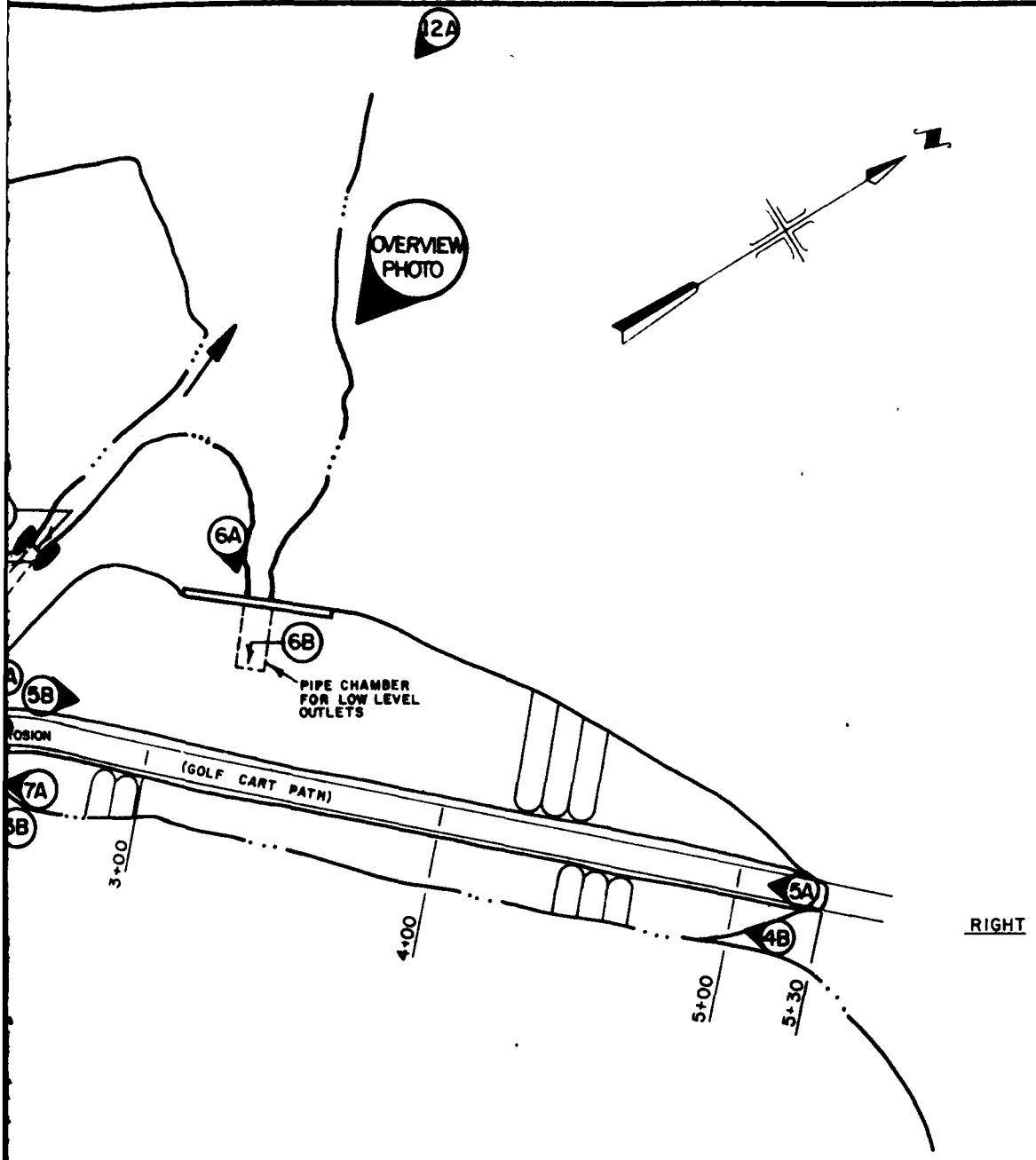
3) Appropriate modifications as a result of investigating the apparent cracking and structural deterioration of the pipe chamber and headwall at the downstream toe.

4) Appropriate modifications as a result of investigating the structural deterioration and leakage into the auxiliary spillway drop inlet structure and outlet conduit.

APPENDIX A

PHOTOGRAPHS


WRIGHT LAKE
11A
11B
10B
8B
EROSION
CULVERT SPILLWAY
7B
8A
5B
EROSION
OUTLET CONDUIT
4A
7A
10A
2B
DAM
3B
2+00
2+30
3+00
1+00
9A
2A
3A
9B
EROSION
DROP INLET
VALVE CHAMBER
0+00
LEFT
BRADLEY LAKE
12B



BRADLEY LAKE DAM
PHOTO INDEX MAP

CITY OF TROY	RENSSELAER CO., N.Y.
SCALE: NONE	DATE JULY 1981

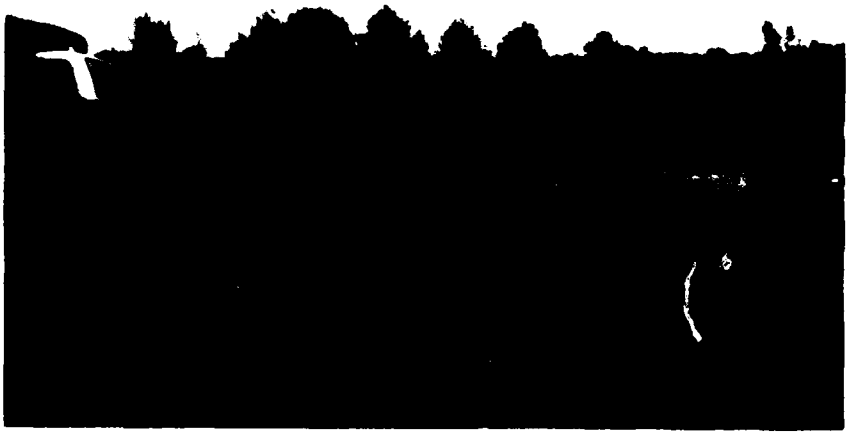
C. T. MALE ASSOCIATES, P.C.
50 Century Hill Drive, Latham, New York 12110
Professional Engineers · Land Surveyors · Land Planning Consultants

2

PROJECT NO. 58-01-00011/80.851

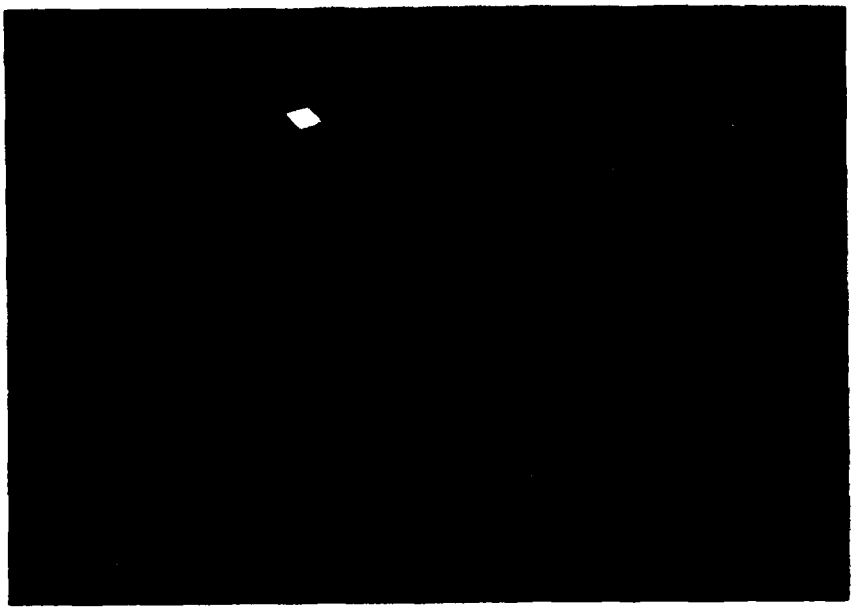
A-1

DWG. NO. 81-18



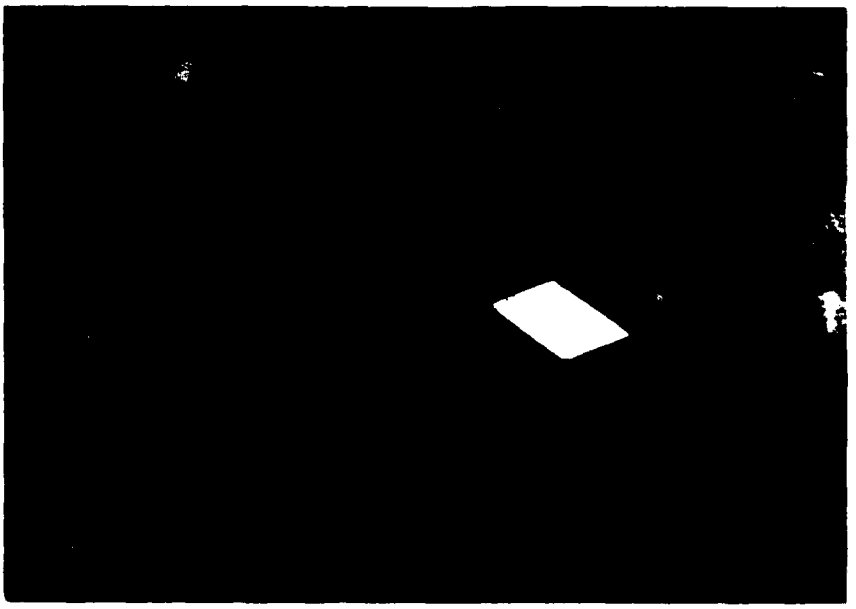
A-2A Top of Dam looking from left abutment. Drop inlet auxiliary spillway is at right in photo - 5/6/81

A-2B View downstream from top of dam at Sta 1+20. Wright Lake is visible in background. Terrace area immediately downstream of toe of dam between Stas 0+00 and 2+00 is covered with unmowed grass and weeds 5/6/81



A-3A Extensive erosion apparently associated with foot traffic on upstream slope close to left abutment - 5/6/81

A-3B Extensive erosion at upstream end of culvert service spillway (Sta 2+30) - 5/6/81



A-4A Sinkhole over collapsed left side of upstream end of culvert service spillway - 5/6/81

A-4B Upstream slope of dam viewed from right abutment. Brush has recently been cut on this slope between right abutment and culvert service spillway in left background - 5/6/81

A-5A Top of dam looking from right abutment. Entrance to culvert service spillway is at bend point (Sta 2+30) - 5/6/81

A-5B Downstream slope of dam viewed from Sta 2+50 looking toward right abutment. Trees, stumps, and logs cover much of the slope, with considerable brush in a zone about 15 feet wide next to crest 5/6/81

A-6A View looking up downstream slope from in front of headwall at entrance to pipe chamber containing the low level outlets. Note deteriorated condition of the stone masonry at headwall -5/6/81

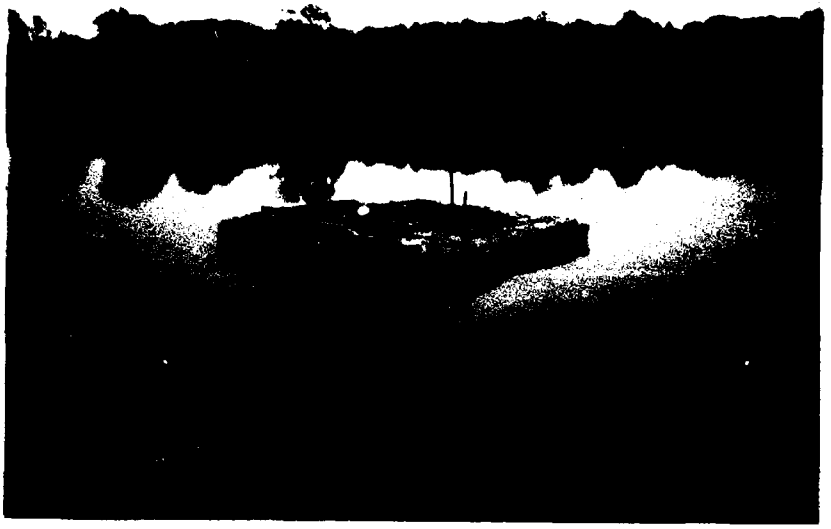
A-6B Valved low level outlets (two 12-inch and one 8-inch) in pipe chamber at toe of dam - 5/6/81

A-7A Entrance to culvert service spillway. Note deterioration of *structure and erosion* - 5/6/81

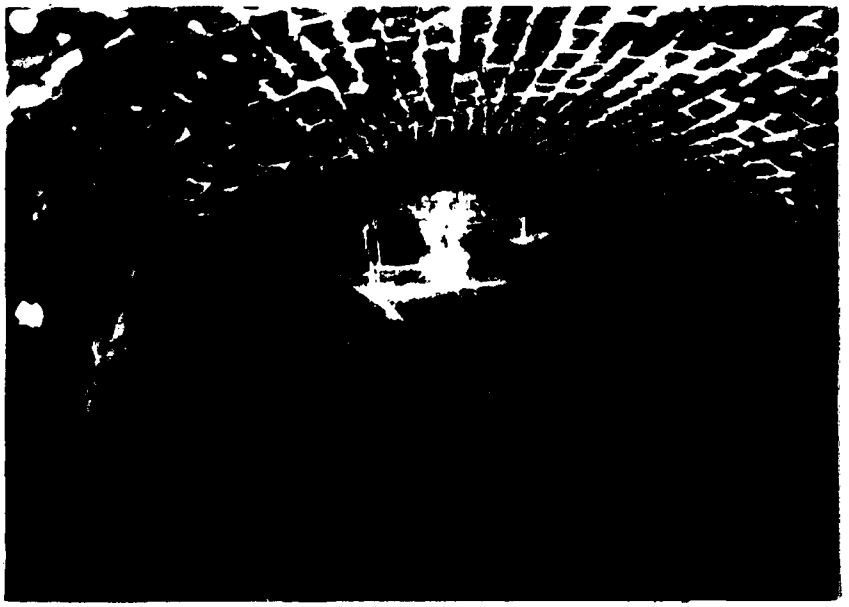
A-7B Inside of culvert service spillway looking downstream - 5/6/81

A-8A Close-up of brick masonry wall of culvert service spillway. Note erosion of mortar joints near flow line at bottom of photo 5/6/81

A-8B Downstream end of culvert service spillway. Note large tree growing atop deteriorated end - 5/6/81



A-9A Drop inlet of auxiliary spillway (foreground) and valve chamber (background) viewed from top of dam. Note two valve/gate stems 5/6/81



A-9B Inside of auxiliary spillway outlet conduit looking at upstream end. The 20-inch pipe along bottom of conduit is a valved outlet from valve chamber - 5/6/81

A-10A Concrete block patch in left wall of auxiliary spillway outlet conduit - 5/6/81

A-10B Downstream end of auxiliary spillway outlet conduit - 5/6/81

A-11A Channel downstream from end of auxiliary spillway outlet conduit, looking upstream - 5/6/81

A-11B Channel further downstream from end of auxiliary spillway outlet conduit, near Wright Lake, looking downstream. Note old riveted steel pipe, remains of stone headwall (arch in left background), trees, brush, and debris in channel - 5/6/81

A-12A Overview of dam looking across upstream end of Wright Lake 5/6/81

A-12B Overview of dam and lake looking from area above left upstream shore - 5/6/81

APPENDIX B

VISUAL INSPECTION CHECKLIST

PHASE I

VISUAL INSPECTION CHECKLIST

1. BASIC DATA

a. General

Name of Dam Bradley Lake Dam

Fed. I.D.# NY00755 DEC Dam No. 226A-14C

River Basin LOWER HUDSON

Location: ~~Town~~ CITY TROY County RENSSELAER

Stream Name PISCAWAN KILL

Tributary of HUDSON RIVER

Latitude (N) 42° 44.9' Longitude (W) 73° 40.1'

Type of Dam EARTH

Hazard Classification HIGH

Date(s) of Inspection MAY 6, 1981

Weather Conditions OVERCAST + COOL, WARM BY NOON

Reservoir Level at Time of Inspection EL 288.2 ft
2" ABOVE SERVICE SPILLWAY CREST

b. Inspection Personnel (*Recorder) THOMAS BENNEDUM - CTM,
EDWIN VOPELAK JR.* CTM, RONALD C. HIRSCHFELD* - GEI

c. Persons Contacted (Including Title, Address & Phone No.)
RICHARD W. CASEY, COMMISSIONER, DEPT. OF PUBLIC UTILITIES
55 LEVERSEE RD., TROY, NY 12182 (518) 270-4500
NEIL BONESTEEL, DEPT OF PUBLIC UTILITIES
(SAME ADDRESS AS R.W. CASEY) (518) 270-4510
DO NOT ACCOMPANY INSPECTION TEAM

d. History
Date Constructed 1860 Date(s) Reconstructed N/A

Designer BARTON + FULLER ENGINEERS

Constructed By UNKNOWN

Owner CITY OF TROY, CITY HALL, MONUMENT SQUARE,
TROY, NY 12180 ATTN: JOHN P. BUCKLEY, CITY MANAGER

1568 Name of Dam Bradley Lake Dam Date May 6, 1981 2

2. EMBANKMENT

a. Characteristics

GEI 1) Embankment Material Unknown. Gray silty sand and gravel is exposed on downstream slope. Tan silty sand and gravel is exposed on upstream slope.

GEI 2) Cutoff Type Unknown

GEI 3) Impervious Core Unknown

GEI 4) Internal Drainage System Unknown

GEI 5) Miscellaneous No comments

GEI b. Crest

GEI 1) Vertical Alignment Good

GEI 2) Horizontal Alignment Good

GEI 3) Lateral Movement No evidence of lateral movement observed

GEI 4) Surface Cracks None observed

GEI 5) Miscellaneous Paved path on crest

GEI c. Upstream Slope

GEI 1) Slope (Estimate H:V) 3.5H:1V

GEI 2) Undesirable Growth or Debris, Animal Burrows Brush has been cut on upstream slope within last year or two.

GEI 3) Sloughing, Subsidence or Depressions None observed

2786 Name of Dam Bradley Lake Dam Date May 6, 1981 3

GEI 4) Slope Protection None.

GEI 5) Surface Cracks or Movement at Toe None observed.

GEI d. Downstream Slope

GEI 1) Slope (Estimate - H:V) 1.6H:1V

GEI 2) Undesirable Growth or Debris, Animal Burrows Trees and brush on downstream slope from Station 2+00 to right abutment.

GEI 3) Sloughing, Subsidence or Depressions No evidence of active sloughing, subsidence, or depressions observed. One inactive erosion channel about one foot deep on downstream slope at Station 3+60.

GEI 4) Surface Cracks or Movement at Toe None observed.

GEI 5) Seepage None observed

GEI 6) External Drainage System (Ditches, Trenches, Blanket) None observed.

GEI 7) Condition Around Outlet Structure Significant erosion at outlet structures for both auxiliary spillway and service spillway. Large tree growing on top of outlet structure for service spillway.

GEI 8) Seepage Beyond Toe None observed

GEI e. Abutments - Embankment Contact

SEE ITEMS 1 & 2 BELOW

4586 Name of Dam Bradley Lake Dam Date May 6, 1981 4

GEI 1) Erosion at Contact Significant erosion at contact between upstream slope and left abutment

GEI 2) Seepage Along Contact None observed.

3. DRAINAGE SYSTEM

GEI a. Description of System None observed

GEI b. Condition of System Not applicable.

GEI c. Discharge from Drainage System Not applicable

4. INSTRUMENTATION (Monumentation/Surveys, Observation Wells, GEI Weirs, Piezometers, Etc.)

None observed.

5. RESERVOIR

GEI a. Slopes Gentle slope. Golf course and Frear Park on perimeter of reservoir.

GEI b. Sedimentation No evidence of significant sedimentation observed.

GEI c. Unusual Conditions Which Affect Dam No comments

1285 Name of Dam Bradley Lake Dam Date May 6, 1981 5

6. AREA DOWNSTREAM OF DAM

a. Downstream Hazard (No. of Homes, Highways, etc.) WRIGHT LAKE IMMEDIATELY D/S. WRIGHT LAKE DAM, AS WELL AS OAKWOOD AVENUE 1000' D/S. ~3000' D/S IS RESIDENTIAL AREA OF TROY, MANY DWELLINGS

GEI b. Seepage, Growth No seepage observed. Trees growing in the area between the downstream toe and Wright Lake which is immediately downstream of the dam.

GEI c. Evidence of Movement Beyond Toe of Dam None observed

d. Condition of Downstream Channel STEEP GROUND W/ EXPOSED BEDROCK D/S OF ENDS OF BOTH SPILLWAY & THEN WRIGHT LAKE.

7. SPILLWAY(S) (Including Discharge Channel)

a. General CULVERT SERVICE SPILLWAY - 4' x 5.5' OVAL BRICK MASONRY CONDUIT, 2 COURSES THICK. INLET OVER CONCRETE SILL (0.5' HIGHER THAN INVERT OF CULVERT) OF OPENING IN RIGHT SIDE OF PIPE AT U/S SLOPE OF DAM. D/S END OF CULVERT SHOWS STONE MASONRY W/ 2 COURSES OF BRICK FORMING INSIDE OF PIPE.

DROP INLET AUXILIARY SPILLWAY - DROP INLET (12' x 3' CLEAR OPENING) W/ VALVE CHAMBER ON U/S SIDE IS BRICK MASONRY STRUCTURE. ABOUT 6' DIAMETER BRICK MASONRY OUTLET CONDUIT, 3 COURSES THICK, FROM BOTTOM OF DROP INLET. 20" DIA CIP LAID IN U/S END OF CONDUIT COMES FROM BOTTOM OF VALVE CHAMBER

b. Conditon of Service Spillway SIGNIFICANT EROSION OF U/S SLOPE OF DAM NEXT TO SPILLWAY. U/S & D/S ENDS IN POOR CONDITION, REST OF CULVERT FAIR.
U/S END - 4' SECTION OF BRICK, HALFWAY AROUND PIPE MISSING JUST TO RIGHT OF INLET OPENING. 4' x 4' SECTION OF BRICK MISSING IN BACK OF OPENING. CONCRETE & BRICK MISSING, WORN & BROKEN AROUND OPENING. CONCRETE @ & OVER OPENING SPALLED & ERODED. HOLE 2x2 ON U/S FACE OF DAM ERODING INTO U/S END OF CULVERT.
D/S END - END OF BRICK CULVERT MISSING. AT LEAST 5' (MAYBE MORE) OF D/S END IS BROKEN AWAY & MISSING, STONE MASONRY EXPOSED. TREE GROWING AROUND D/S END OF CULVERT. BRICKS @ D/S END SPALLED, BROKEN, & LOOSE. REMAINDER OF CULVERT - BOTTOM 1/2 OF CULVERT MORTAR ERODED TO DEPTH OF 1"±. SOME BRICKS SPALLED TO HALF OF THEIR THICKNESS. U/S HALF OF PIPE IN THIS AREA IS IN GOOD CONDITION.

c. Condition of Auxiliary Spillway - GENERALLY POOR CONDITION.
DROP INLET - CREST OF BRICK IS IRREGULAR & DETERIORATING. BRICKS OF SHAFT ARE DETERIORATING W/ SIGNIFICANT (AS MUCH AS 50 GPM) LEAKAGE INTO DROP INLET THROUGH WALLS.
OUTLET CONDUIT - BRICK MISSING IN PLACES TO AS MUCH AS 2 COURSES THICK. SEEPAGE INTO CONDUIT U/S OF CREST. MUCH OF THE BRICK MASONRY IS DETERIORATED; MORTAR LOOSE & MISSING, BRICK SPALLED, BROKEN, & LOOSE. WHOLE LAYERS OF BRICK LINING MISSING. SOME PATCHES ON INSIDE OF CONDUIT, DONE W/ MANHOLE BLOCKS & CEMENT. AT ONE TIME MAY HAVE BEEN BRICK MASONRY CONDUIT FROM ITS PRESENT END DOWN TO EXISTING STONE HEADWALL NEAR WRIGHT LAKE. NO CONDUIT IN THAT AREA EXISTS NOW.

4599 Name of Dam Bradley Lake Dam Date May 6, 1981 6

d. Condition of Discharge Channel D/S OF SERVICE SPILLWAY - ERODED STEEP AREA OF GROUND, ERODED DOWN TO ROCK. DISCHARGES INTO U/S END OF WRIGHT LAKE. D/S OF AUXILLARY SPILLWAY - ERODED MODERATELY STEEP AREA OF GROUND, ERODED DOWN TO ROCK IN PLACES. OLD PIPE SADDLES, SECTIONS OF RIVETED PIPE, ERODED TREES, & OLD STONE HEADWALL ALONG FLOW PATH. DISCHARGES INTO WRIGHT LAKE TO LEFT OF CHANNEL FROM SERVICE SPILLWAY

8. RESERVOIR DRAIN/OUTLET *

a. Type: Pipes 3 Conduit _____ Other _____

b. Material: Concrete _____ Metal ✓ Other _____

c. Size: 2-12" + 1-8" Length UNKNOWN

d. Invert Elevations: Entrance _____ Exit _____

SEE H+H DATA CHECKLIST APPENDIX C

e. Physical Condition (Describe)

Unobservable ONLY D/S ENDS AFTER VALVE IS OBSERVABLE

1) Material CAST IRON PIPE

2) Joints UNKNOWN Alignment UNKNOWN

3) Structural Integrity UNKNOWN, D/S ENDS OF PIPE (ELBOWS) RUSTED + PITTED, PIPE THROUGH DAM UNDER PRESSURE WHEN VALVES ARE CLOSED

4) Hydraulic Capability PIPE CAPACITY UNKNOWN BUT SMALL.

* PIPE CHAMBER (LOCATION OF VALVES DISCUSSED UNDER APPURTENANT STRUCTURES)

f. Means of Control: Gate _____ Valves ✓ Uncontrolled _____

Operation: Operable _____ Inoperable ✓ (BELIEVED TO BE) Other _____

Present Condition (Describe) RUSTED + PITTED, EXPOSED VALVE STEMS RUSTED BADLY.

g. Other Outlets (water mains, diversion pipes) 20" DIAMETER CIP PIPE FROM VALVE CHAMBER, THROUGH BOTTOM OF DROP INLET SHAFT, + ENDING IN OUTLET CONDUIT FROM DROP INLET. SUPPOSED TO BE 75' LONG + HAVE VALVE ON IT IN VALVE CHAMBER. VALVE CHAMBER FULL OF DIRT + DEBRIS; VALVE BURRIED. PIPE IS RUSTED, CAPACITY + STRUCTURAL INTEGRITY U/S OF CONDUIT NOT KNOWN. PORTION IN CONDUIT IS IN GOOD CONDITION BUT D/S END IS BROKEN.

0920 Name of Dam Bradley Lake Dam Date May 6, 1981 7

9. STRUCTURAL

a. Concrete Surfaces - NONE BUT CONCRETE AT U/S END OF CULVERT CONDUIT SPILLWAY, DET. SPILLWAY 7b)

b. Structural Cracking [illegible] SMALL - STRUCTURAL CRACKS AT ALL 4 CORNERS OF BRICK MASONRY STACK. PIPE CHAMBER (VAULT AT TOE OF DAM W/ LOW LEVEL OUTLETS) - STRUCTURAL CRACKS 4' TO 6' FROM D/S END STONE MASONRY HEADWALL AT TOE OF DAM AT END OF PIPE CHAMBER - 1" ± 1/2" WIDE DIAGONAL CRACKS IN WALL, [illegible] OF WALL AT EAST END

c. Movement - Horizontal & Vertical Alignment(Settlement) APPEARS OKAY

GEI d. Junctions with Abutments or Embankments Not applicable.

GEI e. Drains - Foundation, Joint, Face Not applicable

f. Water Passages, Conduits, Sluices NONE EXCEPT THOSE DISCUSSED UNDER SPILLWAYS 7), RESERVOIR DRAIN/OUTLET 8)

GEI g. Seepage or Leakage SOME SEEPAGE INTO AUXILIARY SPILLWAY OUTLET CONDUIT IN AREA FROM DAM CREST TO DROP INLET. STALACTITES OF CALCIUM CARBONATE EMANATE FROM MASONRY JOINTS IN CROWN OF CONDUIT.

0798 Name of Dam Bradley Lake Dam Date May 6, 1981 8

h. Joints - Construction, etc. BRICK MASONRY & STONE MASONRY OF DAM APPURTENANCES IS DETERIORATING. MORTAR OF JOINTS IS ERODED AWAY OR LOOSE IN MANY PLACES. MASONRY TO A DEPTH OF 2 COURSES MISSING IN AUXILIARY SPILLWAY OUTLET CONDUIT.

GEI i. Foundation Not applicable

GEI j. Abutments Not applicable

k. Control Gates BELIEVED TO BE 2 SLIDE GATES ON U/S SIDE OF VALVE CHAMBER (FRONT HALF OF CONTROL TOWER). 2 BROKEN OFF GATE STEM VISIBLE ABOVE WATER. GATE UNDERWATER & NOT OBSERVABLE. INOPERABLE BECAUSE VALVE CHAMBER FILLED W/ EARTH.

l. Approach & Outlet Channels CULVERT SERVICE SPILLWAY - APPROACH CHANNEL IS RESERVOIR SURFACE AT U/S SLOPE OF DAM. STONES & RUBBLE ON SLOPE IN AREA BEFORE SILL IN SIDE OF CULVERT OVER WHICH FLOW PASSES. D/S CHANNEL IS AREA OF STEEP EXPOSED BEDROCK & ERODED SOIL DOWN TO A D/S LAKE, WRIGHT LAKE. AUXILIARY SPILLWAY - RESERVOIR SURROUNDS DROP INLET, 3 SIDES, W/ VALVE CHAMBER FILLED W/ EARTH & DEBRIS ON U/S SIDE. D/S CHANNEL IS AREA OF STEEP EXPOSED BEDROCK & THEN FLATTER ERODED AREA OF SOIL CLOGGED W/ DEBRIS & BRUSH, DOWN TO D/S LAKE, WRIGHT LAKE. WRIGHT LAKE, U/S END W/ DEBRIS IS D/S FROM PIPE CHAMBER W/ LOW LEVEL OUTLETS.

m. Energy Dissipators (Plunge Pool, etc.) NONE. WRIGHT LAKE IS D/S OF OUTLET CHANNELS FROM BOTH SPILLWAYS.

n. Intake Structures CULVERT SERVICE SPILLWAY - NONE. AUXILIARY SPILLWAY - 2"x4" WOOD W/ CHAINLINK FENCE TRASH RACK OVER TOP OF DROP INLET. CHAINLINK IS PULLED AWAY FROM FRAME AT RIGHT SIDE. INTAKE STRUCTURES IN FRONT OF GATES OF OTHER OUTLETS - UNKNOWN.

o. Stability

p. Miscellaneous

8876 Name of Dam Bradley Lake Dam Date May 6, 1981 9

10. APPURTENANT STRUCTURES (Power House, Lock, Gatehouse, Service Bridge, Other)

a. Description:

CONTROL TOWER - BRICK MASONRY STRUCTURE CONSISTING OF VALVE CHAMBER (U/S SIDE) + DROP INLET (D/S SIDE). NO STRUCTURE OVER TOP.

PIPE CHAMBER - VAULT AT TOP OF DAM FOR LOW LEVEL OUTLETS (SEE B.) 9' HIGH (2' DEBRIS IN BOTTOM) x 8' WIDE x 16' DEEP INTO DAM BRICK MASONRY W/ 4' STONE MASONRY AT BOTTOM. BRICK MASONRY AT U/S END W/ BRICK MASONRY STEP AT VALVE LOCATION ACCESS TO CHAMBER IS THROUGH 3½' x 6' BRICK + STONE MASONRY HEADWALL AT TOE OF DAM

b. Condition:

CONTROL TOWER - BRICK IS DETERIORATED ALL OVER STRUCTURE + FALLING OFF OF TOP (3 TO 8 COURSES). STRUCTURAL CRACKS AT CORNERS OF DROP INLET SHAFT W/ LEAKAGE INTO IT. VALVE CHAMBER FILLED IN W/ EARTH + DEBRIS TO TOP.

PIPE CHAMBER - STRUCTURAL CRACKS 4' TO 6' FROM D/S END OF VAULT 1" TO ½" WIDE. DIAGONAL CRACKS IN D/S HEADWALL AS WELL AS UNDERMINING OF WALL AT END. SOME BRICK + STONE MASONRY IS DETERIORATING W/ STONES + BRICK MISSING.

11. MISCELLANEOUS MECHANICAL/ELECTRICAL EQUIPMENT

a. Description:

N/A

b. Condition:

12. OTHER PAVED GOLF CART PATH 9' WIDE ACROSS CREST.

3218

APPENDIX C

HYDROLOGIC AND HYDRAULIC ENGINEERING DATA

CHECKLIST AND COMPUTATIONS

TABLE OF CONTENTS

4595

PHASE I INSPECTION

HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA CHECKLIST

Name of Dam BRADLEY LAKE DAM Fed. Id.# NY00755

1. AREA-CAPACITY DATA

	Elevation (ft.)	Surface Area (acres)	Storage Capacity (acre-ft.)
a. Top of Dam	293.3	11.7 EST.	215
b. Design High Water (Max. Design Pool)	UNKNOWN		
c. Auxiliary Spillway Crest	290.3	9.8 EST.	186
d. Pool Level with Flashboards	N/A		
e. Service Spillway Crest	288	8.3	163

2. DISCHARGES

	Volume (cfs)
a. Average Daily	UNKNOWN
b. Spillway @ Top of Dam (both service & auxiliary)*	680
c. Spillway @ Design High Water	UNKNOWN
d. Service Spillway @ Auxiliary Spillway Crest Elevation	86
e. Low Level Outlet (normally closed & presently inoperable, w/ W.S. at service spillway crest EL 288 & EL 247.5, est. Q = 60 cfs)	0
f. Total (of all facilities) @ Top of Dam	680
g. Maximum Known Flood (Based on observation during inspection of 12/8/70 that crest shows evidence of previous high water & erosion due to overtopping, see Appendix F3-17.)	est. 700
h. At Time of Inspection May 6, 1981, WS @ EL 288.2	6 ±

* Auxiliary spillway @ Top of Dam ≈ 520 cfs
service " " " " " ≈ 160 cfs

4596

3. TOP OF DAM

Elevation 293.3

a. Type EARTH

b. Width 15' Length 530'

c. Spillover CULVERT SPILLWAY & DROP INLET SPILLWAY

d. Location CULVERT SPILLWAY @ STA 2+30, DROP INLET IN RESERVOIR @ 0+75

4. SPILLWAY

	SERVICE	AUXILIARY
a.	288 Elevation	290.3
b.	CULVERT Type	DROP INLET
c.	4' x 5.5' OVAL Width	3' x 12' RECTANGLE, TOTAL WEIR LENGTH OF 30'; 6'± DIA. OUTLET Conduit
d.	Type of Control ✓ Uncontrolled	✓
e.	Controlled: Type (Flashboards; gate)	
f.	Number	
g.	Size/Length	
h.	BRICK Invert Material	BRICK
i.	Anticipated Length of Operating Service	
j.	80' LONG CULVERT Chute Length	150' LONG OUTLET PIPE
k.	essentially ZERO, SLOPING LAKE BOTTOM Height Between Spillway Crest & Approach Channel Invert (Weir Flow)	5 to 10'
l.	Other	

4597

5. OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES

a. Type: Gate____ Sluice____ Conduit ✓ Penstock____

b. Shape round pipes

c. Size Low level outlets: two 12" dia. one 8" dia. Outlet pipe: 20" dia.

d. Elevations: Entrance Invert LL outlets: 247 est. Outlet Pipe: 275 est.

Exit Invert LL outlets: 242 est. Outlet pipe: 274 est.

e. Tailrace Channel: Elevation N/A

6. FLOOD WATER CONTROL SYSTEM

a. Warning System None

b. Method of Controled Releases (mechanisms)

NONE OPERABLE.

7. CLIMATOLOGICAL GAGES REFERENCES 21 22

a. Type NON-RECORDING PRECIPITATION & TEMPERATURE GAGE INDEX** 8600

b. Location TROY LOCK + DAM #2 LAT. 42° 25', LONG. 73° 41', 5000' WEST OF DAM

c. Period of Record 1956 TO PRESENT

d. Maximum Reading UNKNOWN Date

8. STREAM GAGES REFERENCE 23

a. Type WATER-STAGE RECORDER USGS GAGE # 01333500

b. Location LITTLE HOOSIC RIVER AT PETERSBURG, N.Y.

LAT. 42° 45' 50", LONG. 73° 20' 16" ~17 MILES EAST OF DAM

c. Period of Record JULY 1951 TO PRESENT (ALSO SOME SPOT RECORDS)

Drainage Area = 56.1 s.m.

d. Maximum Reading 7,470 cfs = 133.2 cms Date DECEMBER 31, 1948

(FROM FLOOD MARKS)

9. OTHER

R 8/7/81

6169

10. DRAINAGE BASIN CHARACTERISTICS

a. Drainage Area 2,698 SQUARE MILES OR 1,727.2 ACRES

b. Land Use - Type Suburban & rural residential

c. Terrain - Relief Wooded & grassed slopes of 10 to 20%

d. Surface - Soil GLACIAL TILL (?)

e. Runoff Potential (existing or planned extensive alterations to existing surface or subsurface conditions)

NONE KNOWN.

f. Potential Sedimentation Problem Areas (natural or man-made; present or future)

NONE KNOWN.

g. Potential Backwater Problem Areas for Levels at Maximum Storage Capacity (including surcharge storage)

NONE

h. Dikes - Floodwalls (overflow & non-overflow) - Low Reaches Along the Reservoir perimeter

Location DIKE 4' HIGH NEAR LEFT END OF DAM. NATURAL BEHIND DIKE 50'± AWAY IS AS HIGH AS DIKE

Elevation 293.3 (TOP OF DAM)

i. Reservoir

Length @ ~~Maximum Design~~ Service Spillway Crest Pool 1,300 ± (feet)

Length of Shoreline (@ Service Spillway Crest) ~3,200 (feet)


HUDSON
ALBANY CO
RENSSELAER CO
GREEN ISLAND
CHAMPLAIN
CANAL
DELAWARE
Playground
OAKWOOD
CEMETERY
Troy Lock
New Mt Ida Cemetery

DATUM - NGVD 1929, 10' CONTOUR INTERVAL

BASE MAP - 7.5' NYSDOT TOPO QUADS
① TROY SOUTH, N.Y. - 1974
② TROY NORTH, N.Y. - 1974
- 7.5' USGS TOPO QUAD
③ TOMHANNOCK, N.Y. - 1954

REVISED 8-10-81

BRADLEY LAKE DAM
DRAINAGE AREA MAP

CITY OF TROY	RENSSELAER CO., N.Y.
SCALE: 1" = 2000'	DATE: JANUARY 1981

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JOB BRADLEY LAKE DAM
SHEET NO. _____ OF R 8/7/81
CALCULATED BY ELV DATE 5/19/81
CHECKED BY GMB DATE 7/13/81
SCALE 58.01.00011

DRAINAGE AREAS

	AREA (acres)	AREA (square miles)
WATERSHED DIRECT TO TROY RESERVOIR (SUBAREA 1)	960.8	1.501
TROY RESERVOIR SURFACE (SUBAREA 2) @ NORMAL POOL EL = 472 (See C-9)	52.1	.081
		1.582
AREA ABOVE BRADLEY LAKE (SUBAREA 3)	706.0	1.103
BRADLEY LAKE SURFACE (SUBAREA 4) @ NORMAL POOL EL = 288 (See C-13)	8.3	.013
TOTAL DRAINAGE AREA TO BRADLEY LAKE DAM	1,727.2	2.698

Eng CTM-105

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SHEET NO. _____ OF RB/2/B1
CALCULATED BY ELV DATE 5/20/81
CHECKED BY JPR DATE 7/13/81
SCALE SB.01.00011

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 1 : AREA ABOVE TROY RESERVOIR, AREA = 1.501 SQ. MI.

LOSS RATES : 1.0" INITIALLY, 0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS : USE SNYDER METHOD

A = DRAINAGE AREA = 1.501 SQ. MILES
L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = 2.08 MILES
L_{CA} = LENGTH OF MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .80 MILES
C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE
C_p = SNYDER'S PEAKING COEFFICIENT = .66 (FROM REF. 20)
t_p = STANDARD LAG IN HOURS = $C_t (L L_{CA})^{0.3}$ = 2.33 HOURS

Req'd unit rainfall duration = t_r

∴ USE t_p = 2.3 HOURS $t_r = \frac{t_p}{5.5} = \frac{2.3}{5.5} = 0.42$ hr. ≅ 25 min.

use t_r' = 10 min < 25 max. Ok

SUBAREA 2: TROY RESERVOIR SURFACE, AREA = .081 sq. mi. = 52.1 ACRES

LOSS RATES: NONE BECAUSE RAINFALL ≈ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. w/ 10 MINUTE DURATION & 1" RAIN

$$\bar{Q} = \frac{A(1")}{t} = \frac{52.1 \text{ acres}(1")}{10 \text{ minutes}} \left(\frac{43{,}560 \text{ sq. FT.}}{1 \text{ acre}}\right)\left(\frac{1 \text{ FT}}{12 \text{ INCHES}}\right)\left(\frac{1 \text{ MINUTE}}{60 \text{ SECONDS}}\right)$$

$\bar{Q}$ = 315 cfs (w/o LOSS RATE)

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JOB BRADLEY LAKE DAM
SHEET NO. _____ OF RB/7/81
CALCULATED BY CLV DATE 5/20/81
CHECKED BY GAA DATE 7/13/81
SCALE SB.01.00011

DRAINAGE AREA DATA FOR HEC-1 DB MODEL

SUBAREA 3: AREA ABOVE BRADLEY LAKE, AREA = 1.103 SQ. MI.

LOSS RATES: 1.0" INITIALLY, 0.1"/HOUR - CONSTANT LOSS RATE

UNIT HYDROGRAPH PARAMETERS: USE SNYDER METHOD

A = DRAINAGE AREA = 1.103 SQ. MILES
L = LENGTH OF MAIN WATERCOURSE TO UPSTREAM LIMIT OF DRAINAGE AREA = 1.89 MILES
L_{CA} = LENGTH OF MAIN WATERCOURSE TO POINT OPPOSITE THE CENTROID OF THE DRAINAGE AREA = .87 MILES
C_t = SNYDER'S BASIN COEFFICIENT = 2.0 ASSUMED AVERAGE
C_p = SNYDER'S PEAKING COEFFICIENT = .66 (FROM REF. 20)
t_p = STANDARD LAG IN HOURS = $C_t(LL_{CA})^{0.3}$ = 2.32 HOURS

Req'd unit rainfall duration = t_r

∴ USE t_p = 2.3 HOURS $t_r = \frac{t_p}{5.5} = \frac{2.3}{5.5} = 0.42$ hr. ≐ 25 min.

use t_r = 10 min. < 25 max ok

SUBAREA 4: BRADLEY LAKE SURFACE, AREA = .013 SQ. MI. = 8.3 ACRES

LOSS RATES: NONE BECAUSE RAINFALL ≈ RUNOFF FOR WATER SURFACE

UNIT HYDROGRAPH PARAMETERS:

FOR U.H. W/ 10 MINUTE DURATION & 1" RAIN

$$\bar{Q} = \frac{A(1")}{t} = \frac{8.3 \text{ acres } (1")}{10 \text{ minutes}} \left(\frac{43{,}560 \text{ sq. ft.}}{1 \text{ acre}}\right)\left(\frac{1 \text{ ft}}{12 \text{ inches}}\right)\left(\frac{1 \text{ minute}}{60 \text{ seconds}}\right)$$

$\bar{Q}$ = 50 cfs (w/o Loss Rate)

Form CTM-405

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JOB BRADLEY LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/14/81
CHECKED BY GMB DATE 7/13/81
SCALE 58.01.00011

ELEVATION - AREA - STORAGE COMPUTATIONS

TROY RESERVOIR[1] VOLUME: COMPUTED BY METHOD OF CONIC SECTIONS $\Delta V_{12} = h/3 (A_1 + A_2 + \sqrt{A_1 A_2})$

	ELEVATION (NGVD-ft.)	AREA[2] (acres)	INPUT VOLUME (acre-feet)	
SPILLWAY CREST	472 [3]	52.1	1,227[3]	
TOP OF DAM	476.5[3]	62.3 EST.	1,502	(CALC. BY HEC-1DB PROGRAM)
	480	70.3	1,715	
	490	93.0	2,529	

(1) ACCORDING TO NYSDEC FILES TROY RESERVOIR IS ACTUALLY 2 IMPOUNDMENTS, VANDERHEYDEN RESERVOIR (LOWER DAM IS NY00116) AND BRUNSWICK RESERVOIR (UPPER DAM IS NY00114). THE UPSTREAM DAM (NY00114) IS JUST A 12' HIGH BERM WITH 2 LARGE UNCONTROLLED CULVERTS THROUGH IT. THE NATURE OF THE UPSTREAM RESERVOIR DAM IS SUCH THAT BOTH RESERVOIR LEVELS STAY THE SAME. THEREFORE FOR MODELING PURPOSES THE TROY RESERVOIR WAS CONSIDERED TO BE ONE RESERVOIR WITH A UNIFORMLY VARYING STAGE.

(2) FROM USGS TOPOGRAPHIC MAPPING.

(3) FROM PLANS & DATA IN NYSDEC FILES

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JOB BRADLEY LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/14/81
CHECKED BY GPR DATE 7/13/81
SCALE 5B.01.00011

DISCHARGE COMPUTATIONS - TROY RESERVOIR

DAM APPURTENANCES	ELEVATION (NGVD)	SIZE
CHUTE SPILLWAY	CREST EL = 472 (1)	17' CREST LENGTH (1)
DAM	TOP OF DAM = 476.5 (1)	363' CREST LENGTH (1) (EXCLUDING SPILLWAY)

OUTLET WORKS - NOT MODELED, ASSUMED CLOSED

FOR FLOW OVER SPILLWAY + DAM: $Q = 3.087 LH^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER BROAD-CRESTED WEIR, REF. 9)
INPUT ↑ (neglect abutment contractions & variations of coeff.)

ELEVATION (NGVD)	$H_{SPILLWAY}$ (ft.)	H_{DAM} (ft.)	$Q_{SPILLWAY}$ (cfs)	Q_{DAM} (cfs)	Q_{TOTAL} (cfs)
SPILLWAY CREST 472	0	0	0	0	0
473	1	0	52	0	52
474	2	0	148	0	148
475	3	0	273	0	273
476	4	0	420	0	420
TOP OF DAM 476.5	4.5	0	501	0	501
477	5	0.5	587	396	983
478	6	1.5	771	2,059	2,830
479	7	2.5	972	4,429	5,401
480	8	3.5	1,187	7,337	8,524

(1) FROM PLANS & DATA IN NYSDEC FILES

CT-105

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JOB BRADLEY LAKE DAM
SHEET NO. _____ OF _____
CALCULATED BY CLV DATE 5/20/81
CHECKED BY JAB DATE 7/13/81
SCALE 58.01.00011

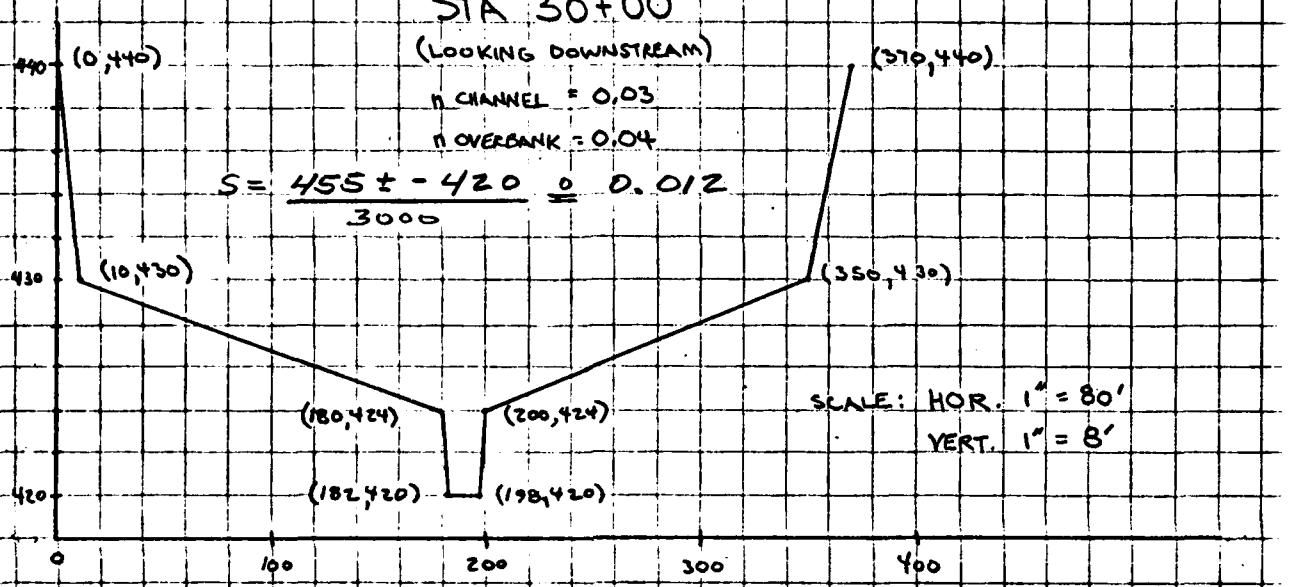
STA 30+00

(LOOKING DOWNSTREAM)

n CHANNEL = 0.03

n OVERBANK = 0.04

$$S = \frac{455 \pm - 420}{3000} \cong 0.012$$



SCALE: HOR. 1" = 80'
VERT. 1" = 8'

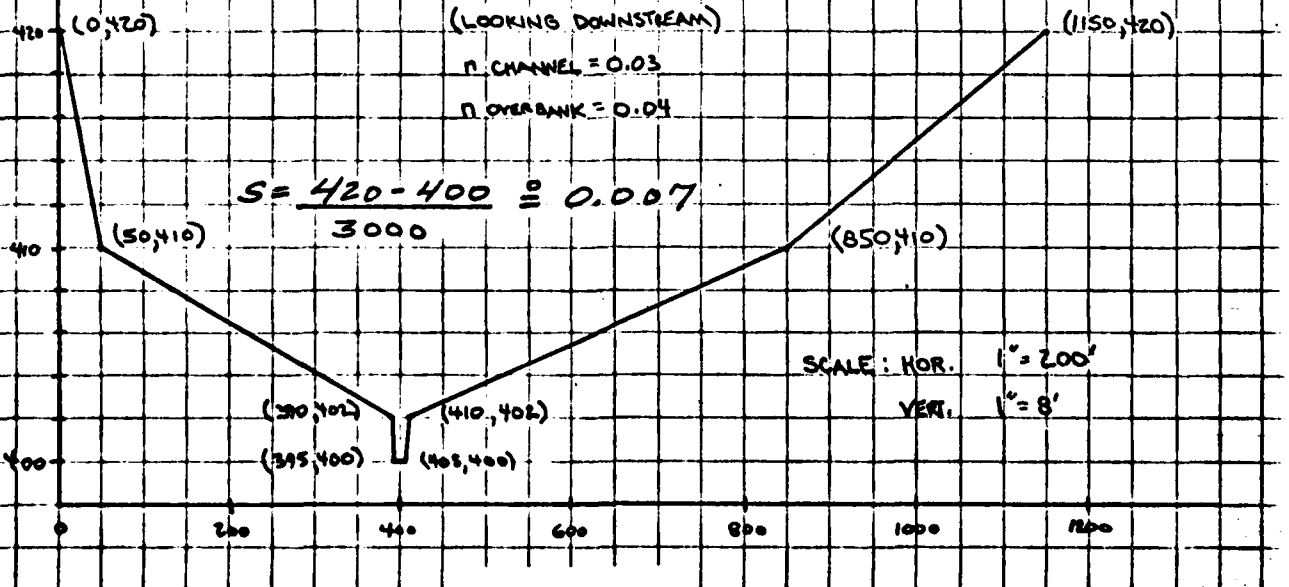
STA 60+00

(LOOKING DOWNSTREAM)

n CHANNEL = 0.03

n OVERBANK = 0.04

$$S = \frac{420 - 400}{3000} \cong 0.007$$



SCALE: HOR. 1" = 200'
VERT. 1" = 8'

PROJECT NO.

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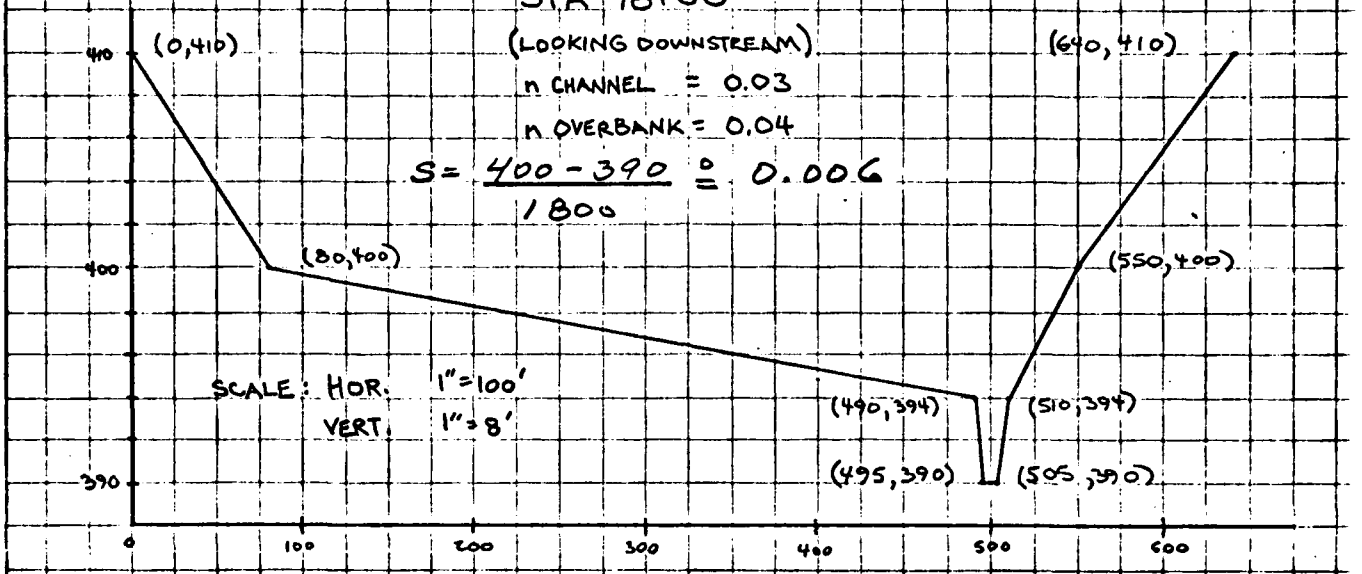
SHEET NO. _____ OF _____
CALCULATED BY ELV DATE 5/20/81
CHECKED BY JPB DATE 7/13/81
SCALE 58.01.00011

STA 78+00
(LOOKING DOWNSTREAM)
n CHANNEL = 0.03
n OVERBANK = 0.04

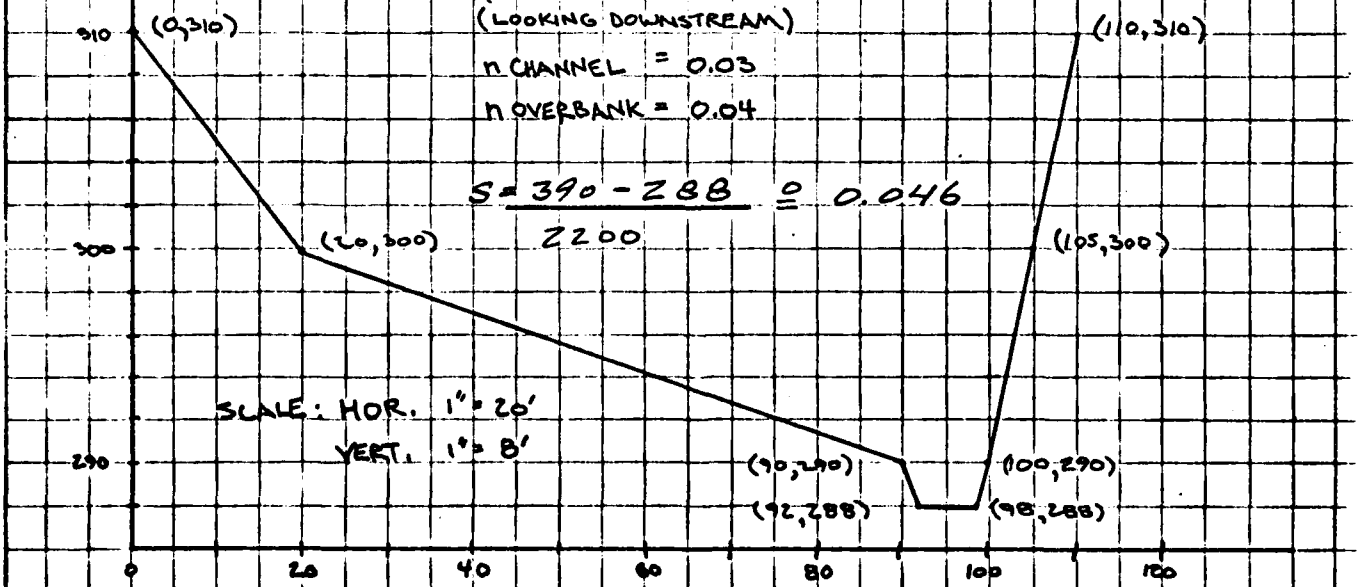
$S = \frac{400 - 390}{1800} \approx 0.006$



SCALE: HOR. 1"=100'
VERT. 1"=8'

STA 100+00
(LOOKING DOWNSTREAM)
n CHANNEL = 0.03
n OVERBANK = 0.04

$S = \frac{390 - 288}{2200} \approx 0.046$



SCALE: HOR. 1"=20'
VERT. 1"=8'

C-105

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SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/19/81
CHECKED BY JMB DATE 7/13/81
SCALE 5B.01.00011

ELEVATION - AREA - STORAGE COMPUTATIONS

BRADLEY LAKE
RESERVOIR VOLUME: COMPUTED BY PROGRAM USING METHOD OF CONIC SECTIONS $\Delta V_{12} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$
By HEC-1 DB Program

	ELEVATION (1) (NGVD - ft.)	INPUT AREA (2) (acres)	VOLUME (acre-feet)
	247.2	.02	0
	251.2	.21	0
	255.2	1.22	3
	259.2	2.46	10
	263.2	3.29	22
	267.2	4.03	36
	271.2	4.83	54
	275.2	5.62	75
	279.2	6.40	99
	283.2	7.17	126
SERVICE SPILLWAY CREST →	288	8.30	163
AUXILIARY SPILLWAY CREST →	290.3 (4)	9.8 EST.	186 EST.
TOP OF DAM →	293.3 (4)	11.7 EST.	215
	300	16.0 (3)	306

(1) NGVD IS 1.2' HIGHER THAN ELEVATION BASE OF JUNE 1894 CONTOUR MAPPING, APPENDIX G-1, BASED ON USGS MAPPING.

(2) FROM CONTOUR MAPPING, APPENDIX G-1, EXCEPT WHERE NOTED.

(3) FROM USGS CONTOUR MAPPING.

(4) Field measurement

CTM 405

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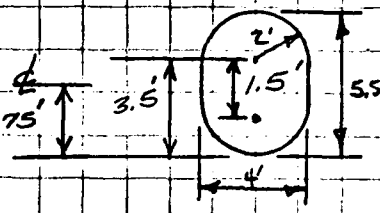
SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/19/81
CHECKED BY PAR DATE 7/13/81
SCALE SB.01.00011

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

SERVICE SPILLWAY (CULVERT SPILLWAY)



FOR SPILLWAY FLOWING PARTIALLY FULL:

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2} \quad \text{(MANNING FORMULA)}$$

OR

$$\text{APPROX. } Q = \left(\frac{A^3 g}{T}\right)^{1/2}$$ (liberal) (FORMULA FOR CRITICAL FLOW THROUGH ANY SECTION; REF. 8)

S = SLOPE ≈ .05 est.
n = .016 (BRICK PIPE)
A = AREA
R = $\frac{A}{P}$ = HYDRAULIC RADIUS
P = WETTED PERIMETER
T = W.S. TOP WIDTH

FOR SPILLWAY FLOWING FULL:
(INLET CONTROL)

$$Q = .6A\sqrt{2gh}$$ (FORMULA FOR ORIFICE FLOW, REF. 9 for free discharge) h measured to ℄

	ELEVATION (NGVD)	HEIGHT ABOVE INVERT (ft)	T (ft)	A (ft²)	R (ft)	$Q_{MANNING}$ (cfs)	$Q_{CRITICAL\ PARTIALLY\ FULL}$ (cfs)	h (ft)	$Q_{ORIFICE}$ (cfs)		$Q_{SERVICE\ SPILLWAY}$ (cfs)
	287.5 (1)	0	0	—	—	0	0				0
SERVICE SPILL CREST	288 (2)	.5	2.7	0.91	0.31	9	3				≅ 0 ±
	289.5	2	4	6.28	1	131	45				45
	291	3.5	4	12.28	1.32	308	(122)	0.75	51	USE	122
	293	5.5		18.57	1.19	434		2.75	148		148
TOP OF DAM	293.3	5.8		"	"			3.05	156		156
	294	6.5		"	"			3.75	173		173
	295	7.5		"	"			4.75	195		195
	296	8.5		"	"			5.75	214		214
	297	9.5		"	"			6.75	232		232
	298	10.5		"	"			7.75	249		249
	299	11.5		18.57	1.19			8.75	264		264

(1) INLET INVERT OF CULVERT SPILLWAY PIPE.
(2) SILL ELEVATION OF INLET U/S OF CULVERT SPILLWAY PIPE INVERT. NO FLOW IN SPILLWAY BELOW THIS ELEVATION.

Form CIM-405A

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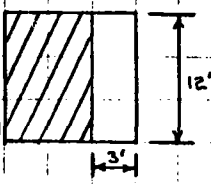
JOB BRADLEY LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY ELV DATE 5/19/81
CHECKED BY JAR DATE 7/13/81
SCALE 58.01.00011

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

AUXILIARY SPILLWAY (DROP INLET)

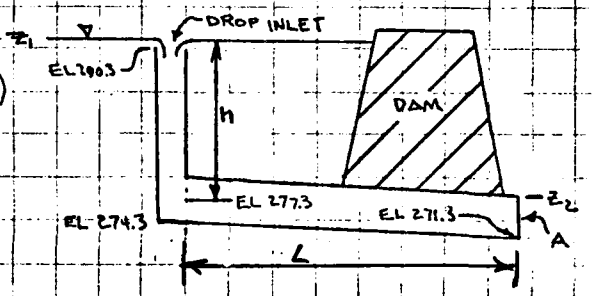
CONSISTS OF: 2 - 12' WEIRS + 2 - 3' WEIR FOR A TOTAL WEIR LENGTH OF 30' + HAS A 6' DIA OUTLET PIPE ± (Field Measure.)

PLAN OF DROP INLET



FOR FLOW WHEN WEIR FLOW CONTROLS:

$$Q = 3.33\,LH^{1.5}$$ (FORMULA FOR CRITICAL FLOW OVER SHARP-CRESTED WEIR, REF. 9)



FOR FLOW WHEN SPILLWAY OUTLET PIPE CONTROLS (INLET CONTROL):

$$Q = .6A\sqrt{2gh}$$ (FORMULA FOR ORIFICE FLOW (INLET CONTROL), REF. 9, FREE DISCHARGE)

FOR FLOW WHEN SPILLWAY OUTLET CONDUIT CONTROLS (OUTLET CONTROL):

$$h_f = \frac{Q^2 n^2 L}{2.21\,A^2 R^{4/3}}$$ (MANNINGS EQUATION)

$$h_{entrance} = k_{en}\frac{V^2}{2g}$$

$$\frac{P}{\gamma}^{\sim 0} + \frac{V^2}{2g}^{\sim 0} + Z_1 = \frac{P}{\gamma}^{\sim 0} + \frac{V_2^2}{2g} + Z_2 + h_{en} + h_f$$ (Bernoulli Eq.)

$$Q = \left(\frac{Z_1 - Z_2}{\frac{k_{en}+1}{2gA^2} + \frac{n^2 L}{2.21 A^2 R^{4/3}}}\right)^{1/2}$$

$$Q = \left(\frac{Z_1 - 277.3}{4.181\times10^{-5}}\right)^{1/2}$$

S = slope ≐ 0.02 est.
L = 150' (ESTIMATE)
n = .016 (BRICK PIPE)
D = 6' DIA.
k_{en} = 0.5

$$A = \frac{\pi D^2}{4} = 28.27\,\text{ft}^2$$

$$R = \frac{A}{P} = \frac{D}{4} = \frac{6}{4} = 1.5'$$

$V = Q/A$

FOR THIS PARTICULAR DROP INLET THE ℄ OF THE INLET END OF THE OUTLET PIPE + Z_2 ARE AT THE SAME ELEVATION, EL 277.3

OR $h = Z_1 - Z_2$

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JOB BRADLEY LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/19/81
CHECKED BY [illegible] DATE 7/13/81
SCALE 58.01.00011

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM

AUXILIARY SPILLWAY (DROP INLET)

	WATER SURFACE ELEVATION (NGVD)	H (ft)	h ($z_1 - z_2$) (ft)	Q_{WEIR} (cfs)	Q_{PIPE} (INLET CONTROL) (cfs)	Q_{PIPE} (OUTLET CONTROL) (cfs)		$Q_{AUXILIARY\ SPILLWAY}$ (cfs)
SER. SPILL.	288	—	—	0				0
AUX. SPILL.	290.3	0	13	0				0
	291	1.7	13.7	59	504	572		59
	292	1.7	14.7	221	522	593		221
	293	2.7	15.7	443	539	613		443
TOP OF DAM	293.3	3	16	519	544	619	(SAY 520)	519
	294	3.7	16.7	711	556	632		556
	295	4.7	17.7		573	650		573
	296	5.7	18.7		589	669		589
	297	6.7	19.7		604	686		604
	298	7.7	20.7		619	704		619
	299	8.7	21.7		634	720		634

C. T. MALE ASSOCIATES, P.C.
ENGINEERS SURVEYORS ARCHITECTS
LANDSCAPE ARCHITECTS PLANNERS
3000 TROY ROAD, SCHENECTADY, N.Y. 12309
(518) 785-0976

JOB BRADLEY LAKE DAM
SHEET NO. ____ OF ____
CALCULATED BY CLV DATE 5/19/81
CHECKED BY [illegible] DATE 7/13/81
SCALE 58.01.00011

DISCHARGE COMPUTATIONS - BRADLEY LAKE DAM SUMMARY

DAM APPURTENANCE	ELEVATION (NGVD)	SIZE
SERVICE SPILLWAY (CULVERT SPILLWAY)	CREST EL = 288	4' x 5.5' OVAL
AUXILIARY SPILLWAY (DROP INLET)	CREST EL = 290.3	30' TOTAL WEIR LENGTH
DAM	TOP OF DAM EL = 293.3	530' CREST LENGTH
LOW LEVEL DRAIN	INVERT EL 247 ± estimated (2 - 12" pipes & 1 - 8" pipe, total Area = 1.9 ft²)	

FOR FLOW OVER DAM: (INPUT TO PROGRAM) $Q_{DAM} = 3.087 L H^{1.5}$ (FORMULA FOR CRITICAL FLOW OVER A BROAD-CRESTED WEIR, REF. 9)

	ELEVATION (NGVD)	$H_{SERVICE\ SPILLWAY}$ (ft)	$H_{AUXILIARY\ SPILLWAY}$ (ft)	H_{DAM} (ft)	$Q_{SERVICE\ SPILLWAY}$ (cfs)	$Q_{AUXILIARY\ SPILLWAY}$ (cfs)	INPUT $Q_{SPILL\ COMB.}$ (cfs)	Q_{DAM} (cfs)
SERVICE SPILLWAY CREST →	288	0	0	0	0	0	0	0
	289.5	1.5	0	0	45	0	45	0
AUXILIARY SPILLWAY CREST →	290.3	2.3	0	0	86 EST.	0	86	0
	291	3	.7	0	122	59	181	0
	292	4	1.7	0	135 EST.	221	356	0
	293	5	2.7	0	148	443	591 SAY	0
TOP OF DAM →	293.3	5.3	3	0	156 (160)	519 (520)	675 (680)	0
	294	6	3.7	.7	173	556	729	958
	295	7	4.7	1.7	195	573	768	3,626
	296	8	5.7	2.7	214	589	803	7,259
	297	9	6.7	3.7	232	604	836	11,644
	298	10	7.7	4.7	249	619	868	16,671
	299	11	8.7	5.7	264	634	898	22,265

CT-105

```
A NYD DAM INSPECTION: DACW51-81-C-0014
A NY00755, BRADLEY LAKE DAM, 80.00851
A OVERTOPPING ANALYSIS  BLD1
B    288         0        10                                                  4
B1     5
J      1         2         1
J1   1.0       0.5
K      0      SA-1                                    1
K1 SUBAREA 1 RUNOFF COMPUTATION
M      1         1     1.361                         10                      1
P               19.5       111       123       132       142
T                                                            1.0      .10
U    2.3       .66
X     -2         1
K      0      SA-2                                    1
K1 SUBAREA 2 (TROY RESERVOIR) RUNOFF COMPUTATION
M      1        -1     0.061                         10                      1
P               19.5       111       123       132       142
T                                                            0        0
U      1
J1   315
X     -2         1
K      2     SA-2C                                    1
K1 COMBINING HYDROGRAPHS 1 & 2
K      1       RES                                    1
K1 ROUTING FLOW THROUGH TROY RESERVOIR
Y                                          1         1
Y1     1                                                    -472        0
S5  1227      1715      2529
SL   472       480       490
S*   472        17     3.067       1.5
S0 476.5     3.387       1.5       363
K      1    30+00                                     5         1
K1 CHANNEL ROUTING STA 30+00
Y                                          1         1
Y1     1                                                      -1
Y6   .04       .03       .04       420       440      3000      .012
Y7     0       440        10       430       180       424       182       420       198       423
Y7   200       424       350       430       570       440
K      1    60+00                                     5         1
K1 CHANNEL ROUTING STA 60+00
Y                                          1         1
Y1     1                                                      -1
Y6   .04       .03       .04       400       420      3000      .007
Y7     0       420        50       410       390       402       395       400       405       400
Y7   410       402       850       410      1150       420
K      1    78+00                                     5         1
K1 CHANNEL ROUTING STA 78+00
Y                                          1         1
Y1     1                                                      -1
Y6   .04       .03       .04       390       410      1800      .006
Y7     0       410        80       400       490       394       495       390       505       393
Y7   510       394       550       400       640       410
K      1   100+00                                     5         1
K1 CHANNEL ROUTING STA 100+00
Y                                          1         1
Y1     1                                                      -1
Y6   .04       .03       .04       288       310      2200      .046
Y7     0       310        20       300        90       290        92       288        98       288
Y7   100       290       105       300       110       310
```

```
K       0    SA-3                                                    1
KI SUBAREA 3 RUNOFF COMPUTATION
M       1       1   1.103              10                                   1
P               19.5     111     123     132     142
T                                                       1.0     .10
U     2.3     .66
X      -2               1
K       0    SA-4                                                    1
KI SUBAREA 4 (BRADLEY LAKE) RUNOFF COMPUTATION
M       1      -1    .013              10                                   1
P               19.5     111     123     132     142
T                                                       0       0
U       1
UI     50
X      -2               1
K       3    SA-4C                                                   1
KI COMBINING HYDROGRAPHS 2C,3&4
K       1    RES                       2                1
KI ROUTING FLOW THROUGH BRADLEY LAKE
Y                                 1      1
YI      1                                                -288    -1
Y4    288   289.5   290.3     291     292     293   293.3     294     295     296
Y4    297     298     299
Y5      0      45      86     181     356     591     675     729     768     803
Y5    836     868     898
YA    .02     .21    1.22    2.46    3.29    4.03    4.83    5.62    6.40    7.17
YA   8.30    16.0
YC  247.2   251.2   255.2   259.2   263.2   267.2   271.2   275.2   279.2   283.2
YC    286     300
Y*    288
YD  293.3   3.087     1.5     530
K      99
A
A
A
A
A
```

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**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********

RUN  DATE: 8/07/81
     TIME: 1:46 PM


NYD DAM INSPECTION: DACW51-81-C-0014
NY00755, BRADLEY LAKE DAM, 80.00851
OVERTOPPING ANALYSIS  6LDI

                                JOB SPECIFICATION
      NO      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
     288       0       10        0        0        0        0        0        4        0
                                JOPER      NWT    LROPT    TRACE
                                    5        0        0        0


                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                NPLAN= 1  NRTIO= 2  LRTIO= 1
          RTIOS=   1.00    0.50

**********      **********      **********      **********      **********

                          SUB-AREA RUNOFF COMPUTATION

SUBAREA 1 RUNOFF COMPUTATION
                        ISTAG    ICOMP    IECON    ITAPE    JPLT     JPRT    INAME    ISTAGE   IAUTO
                        SA-1        0        0        0        0        0        1        0        0

                                HYDROGRAPH DATA
          IHYDG    IUHG    TAREA    SNAP    TRSDA    TRSPC    RATIO    ISNOW    ISAME    LOCAL
              1       1     1.50    0.00    19.00     0.00    0.000        0        1        0

                                PRECIP DATA
                        SPFE     PMS      R6      R12      R24      R48      R72      R96
                        0.00    19.50   111.00   123.00   132.00   142.00    0.00     0.00
TRSPC COMPUTED BY THE PROGRAM IS 0.800

                                LOSS DATA
          LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
              0    0.00    0.00    1.00    0.00    0.00    1.00    1.00    0.10    0.00    0.00

                                UNIT HYDROGRAPH DATA
                            TP=  2.30    CP=0.66    NTA=  0

                                RECESSION DATA
                        STRTQ=   -2.00    QRCSN=    0.00    RTIOR= 1.00

     UNIT HYDROGRAPH TO END-OF-PERIOD ORDINATES, LAG=    2.28 HOURS, CP= 0.65  VOL= 1.00
       6.      21.      43.      68.      96.     126.     157.     188.     218.     242.
     261.     275.     283.     286.     282.     268.     247.     227.     208.     191.
     175.     160.     147.     135.     124.     114.     104.      95.      88.      81.
      74.      68.      62.      57.      52.      48.      44.      40.      37.      34.
      31.      29.      26.      24.      22.      20.      15.      17.      16.      14.
      13.      12.      11.      10.       9.       9.       8.       7.       7.       6.
       6.       5.       5.       4.       4.       4.       3.       3.       3.       3.
```

SUM 22.15 18.49 3.66 104956.
(563.)(470.)(93.)(2972.02)

SUB-AREA RUNOFF COMPUTATION

SUBAREA 2 (TROY RESERVOIR) RUNOFF COMPUTATION

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	SA-2	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	-1	0.06	0.00	10.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.50	111.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

RECESSION DATA

STRTQ= -2.00 QRCSN= 0.00 RTIOR= 1.00

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.15	22.15	0.00	7663.
										(563.)(563.)(0.)(200.00)			

COMBINE HYDROGRAPHS

COMBINING HYDROGRAPHS 1 & 2

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	SA-2C	2	0	0	0	0	1	0	0

HYDROGRAPH ROUTING

ROUTING FLOW THROUGH TROY RESERVOIR

	ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	RES	1	0	0	0	0	1	0	0

ROUTING DATA

	QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
	0.0	0.000	0.00	1	1	0	0	0

	NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
	1	0	0	0.000	0.000	0.000	-472.	0

CAPACITY=	1227.	1715.	2529.
ELEVATION=	472.	480.	490.

C-21

CREL	SPILD	COOR	EXPS	ELEVL	COOL	CAREA	EXPL
472.0	17.0	3.1	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
476.5	3.1	1.5	363.

PEAK OUTFLOW IS 3180. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 1394. AT TIME 42.67 HOURS

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0300	0.0400	420.0	440.0	3000.	0.01200

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 440.00 10.00 430.00 180.00 424.00 182.00 420.00 196.00 420.00
200.00 424.00 350.00 430.00 370.00 440.00

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0300	0.0400	400.0	420.0	3000.	0.00700

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 420.00 50.00 410.00 390.00 402.00 395.00 400.00 405.00 400.00
410.00 402.00 850.00 410.00 1150.00 420.00

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0300	0.0400	390.0	410.0	1800.	0.00600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 410.00 80.00 400.00 490.00 394.00 495.00 390.00 505.00 390.00
510.00 394.00 550.00 400.00 640.00 410.00

NORMAL DEPTH CHANNEL ROUTING

GN(1)	GN(2)	GN(3)	ELNVT	ELMAX	RLNTH	SEL
0.0400	0.0300	0.0400	288.0	310.0	2200.	0.04600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00 310.00 20.00 300.00 90.00 290.00 92.00 288.00 98.00 288.00
100.00 290.00 105.00 300.00 110.00 310.00

SUB-AREA RUNOFF COMPUTATION

SUBAREA 3 RUNOFF COMPUTATION

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	SA-3	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.10	0.00	10.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.50	111.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	0.10	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 2.30 CP=0.66 NTA= 0

RECESSION DATA

STRTQ= -2.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH TO END-OF-PERIOD ORDINATES, LAG= 2.28 HOURS, CP= 0.65 VOL= 1.00

4.	15.	31.	50.	71.	93.	115.	138.	160.	178.
192.	202.	208.	210.	207.	197.	181.	166.	153.	140.
129.	118.	108.	99.	91.	84.	77.	70.	64.	59.
54.	50.	46.	42.	38.	35.	32.	30.	27.	25.
23.	21.	19.	18.	16.	15.	14.	13.	11.	11.
10.	9.	8.	7.	7.	6.	6.	5.	5.	4.
4.	4.	3.	3.	3.	3.	2.	2.	2.	2.

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.15	18.49	3.66	77109.
										(563.)	(470.)	(93.)	(2183.48)

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

SUBAREA 4 (BRADLEY LAKE) RUNOFF COMPUTATION

	ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
	SA-4	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	-1	0.01	0.00	10.00	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	19.50	111.00	123.00	132.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS 0.800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00

RECESSION DATA

STRTQ= -2.00 QRCSN= 0.00 RTIOR= 1.00

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	22.15	22.15	0.00	1111.
										(563.)(563.)(0.)(31.46)			

********** ********** ********** ********** **********

COMBINE HYDROGRAPHS

COMBINING HYDROGRAPHS 2C,3&4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
SA-4C	3	0	0	0	0	1	0	0

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTING FLOW THROUGH BRADLEY LAKE

ISTAG	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
RES	1	0	0	2	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTOL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-288.	-1

STAGE	286.00	289.50	290.30	291.00	292.00	293.00	293.30	294.00	295.00
	297.00	298.00	299.00						
FLO=	0.00	45.00	86.00	181.00	356.00	591.00	675.00	729.00	768.00
	836.00	868.00	898.00						
SURFACE AREA=	0.	0.	1.	2.	3.	4.	5.	6.	6.	7.
	8.	16.							
CAPACITY=	0.	0.	3.	10.	22.	36.	54.	75.	99.	126.
	163.	306.							
ELEVATION=	247.	251.	255.	259.	263.	267.	271.	275.	279.	283.
	288.	300.							

CREL	SPWID	COGW	EXPW	ELEVL	COGL	CAREA	EXPL
288.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0

DAM DATA

TOPEL	COGD	EXPD	DAMWID
293.3	3.1	1.5	530.

PEAK OUTFLOW IS 5379. AT TIME 42.17 HOURS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 0.50
HYDROGRAPH AT	SA-1	1.58 (4.10)	1	3153. (89.29)	1577. (44.65)
HYDROGRAPH AT	SA-2	0.08 (0.21)	1	933. (26.42)	466. (13.21)
2 COMBINED	SA-2C	1.58 (4.10)	1	3253. (92.13)	1627. (46.06)
ROUTED TO	RES	1.58 (4.10)	1	3180. (90.05)	1394. (39.48)
ROUTED TO	30+00	1.58 (4.10)	1	3176. (89.94)	1391. (39.40)
ROUTED TO	60+00	1.58 (4.10)	1	3159. (89.45)	1380. (39.07)
ROUTED TO	78+00	1.58 (4.10)	1	3153. (89.29)	1375. (38.94)
ROUTED TO	100+00	1.58 (4.10)	1	3151. (89.22)	1376. (38.96)
HYDROGRAPH AT	SA-3	1.10 (2.86)	1	2317. (65.61)	1159. (32.81)
HYDROGRAPH AT	SA-4	0.01 (0.03)	1	148. (4.19)	74. (2.10)
3 COMBINED	SA-4C	2.70 (6.99)	1	5380. (152.34)	2330. (65.99)
ROUTED TO	RES	2.70 (6.99)	1	5379. (152.32)	2324. (65.82)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	472.00	472.00	476.50
STORAGE	1227.	1227.	1502.
OUTFLOW	0.	0.	501.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	476.15	1.65	1602.	3160.	8.00	42.00	0.00
0.50	477.27	0.77	1549.	1394.	4.83	42.67	0.00

PLAN 1 STATION 30+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3176.	426.8	42.17
0.50	1391.	425.2	42.83

PLAN 1 STATION 60+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3155.	405.2	42.33
0.50	1380.	404.1	43.00

PLAN 1 STATION 78+00

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3153.	397.3	42.33
0.50	1375.	395.8	43.17

PLAN 1 STATION 100+00

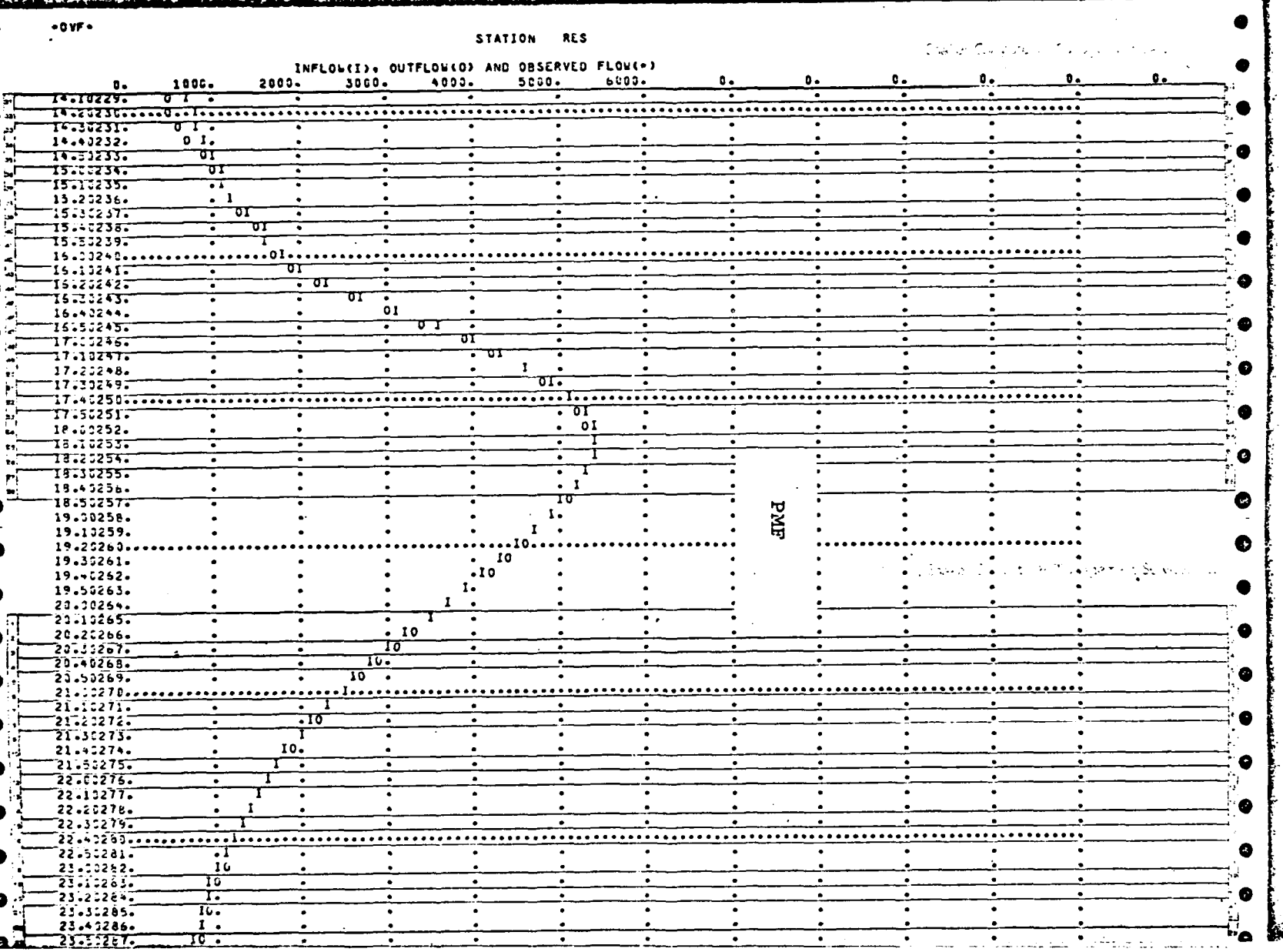
RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3151.	294.6	42.33
0.50	1376.	292.7	43.17

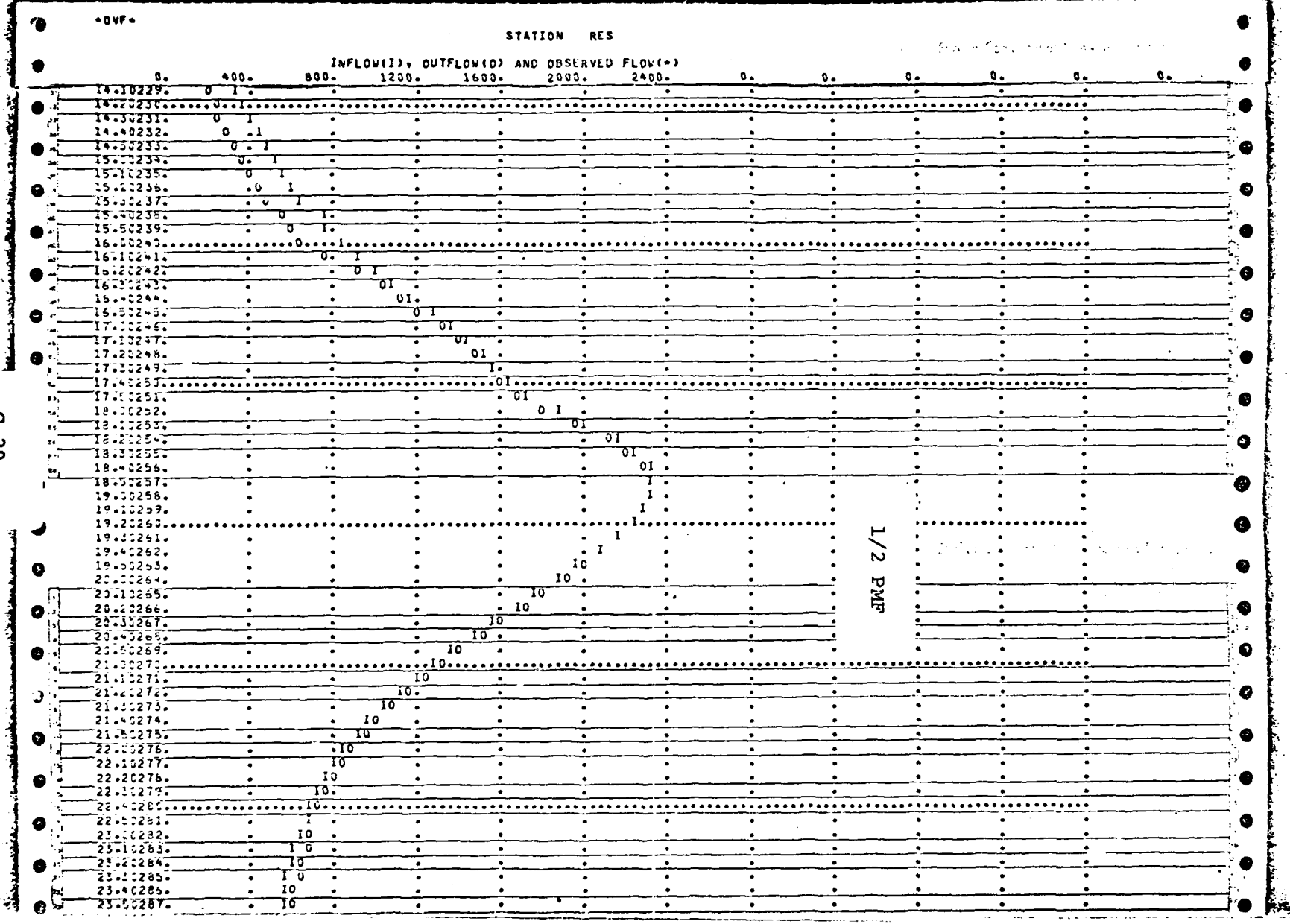
SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

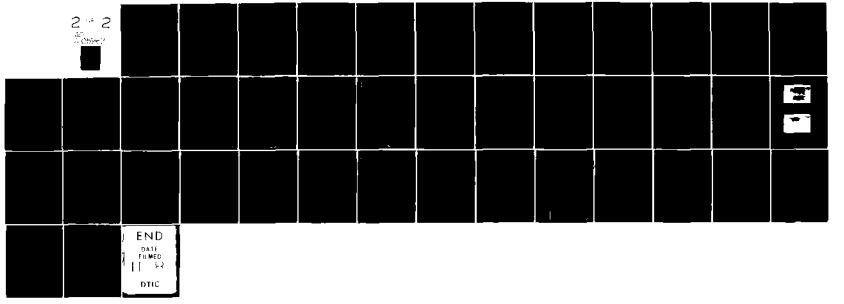
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	288.00	288.00	293.30
STORAGE	163.	163.	215.
OUTFLOW	0.	0.	675.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	295.29	1.99	259.	5379.	9.50	42.17	0.00
0.50	294.28	0.98	227.	2524.	7.00	43.00	0.00


OVF
STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 1000. 2000. 3000. 4000. 5000. 6000.
PMF


OVF
STATION RES
INFLOW(I), OUTFLOW(O) AND OBSERVED FLOW(*)
0. 400. 800. 1200. 1600. 2000. 2400.
1/2 PMF

AD-A105 962 MALE (C T) ASSOCIATES SCHENECTADY NY F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. BRADLEY LAKE DAM (INVENTORY NY--ETC(U)
JUL 81 K J MALE, W M SMITH DACW51-81-0014
UNCLASSIFIED NL



APPENDIX D

STABILITY ANALYSIS

NO GRAVITY STRUCTURES TO ANALYZE

APPENDIX E

REFERENCES

BRADLEY LAKE DAM, NY 00755

PHASE I INSPECTION REPORT

REFERENCES

This is a general list of references pertinent to dam safety investigations. Not all references listed have necessarily been used in this specific report.

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2. "HEC-1 Flood Hydrograph Package, Users Manual", The Hydrologic Engineering Center, U.S. Army Corps of Engineers, January 1973.

3. "Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations", The Hydrologic Engineering Center, U.S. Army Corps of Engineers, September 1978.

4. HMR 33, "Seasonal Variations of Probable Maximum Precipitation, East of the 105th Meridian for Areas 10 to 1000 Square Miles and Durations from 6 to 48 Hours," U.S. Dept. of Commerce, NOAA, National Wheitno Service, 1956.

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6. HYDRO-35, "Five-to-60 Minute Precipitation Frequency for the Eastern and Central United States", U.S. Dept. of Commerce, NOAA, National Weather Service, June 1977.

7. "Technical Paper No. 40, Rainfall Frequency Atlas of the United States", U.S. Dept. of Commerce, Weather Bureau, 1961.

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9. King, Horace W. and Brater, Ernest F., Handbook of Hydraulics, fifth edition, McGraw-Hill Book Co., Inc., New York, N. Y., 1963.

10. "Flood Hydrograph Analyses and Computations", EM 1110-2-1405, U.S. Army Corps of Engineers, 31 August 1959.

11. "Technical Release No. 55, Urban Hydrology for Small Watersheds", U.S. Dept. of Agriculture, Soil Conservation Service (Engineering Division), January 1975.

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14. "Standard Project Flood Determinations", EM 1110-2-1411, U.S. Army Corps of Engineers, 26 March 1952.

15. "Hydrologic and Hydraulic Assessment", Appendix D of EC 1110-2-188, U.S. Army Corps of Engineers, 30 December 1977.

16. "Reviews of Spillway Adequacy, National Program of Inspection of Non-Federal Dams", ETL 1110-2-234, U.S. Army Corps of Engineers, 10 May 1978.

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19. "Guide for Making a Condition Survey of Concrete in Service", American Concrete Institute (ACI) Journal, Proceedings Vol. 65, No. 11, November 1968, pages 905-918.

20. "Upper Hudson & Mohawk River Basins, Hydrologic Flood Routing Models", New York District, Corps of Engineers, October 1976.

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22. "Climatological Data, New York, September 1980", Volume 92, No. 9, National Oceanic and Atmospheric Administration, Asheville, North Carolina.

23. "Water Resources Data For New York, Water Year 1979", Volume 1, USGS Water-Data Report NY-79-1, U.S. Geological Survey, Albany, New York, 1980.

24. "Maximum Known Stages and Discharges of New York Streams Through 1973", Bulletin 72, U.S. Geological Survey, 1976.

25. "Characteristics of New York Lakes (Gazetteer)", Bulletin 68, U.S. Geological Survey and NYS Department of Environmental Conservation, 1970.

26. "Geologic Map of New York", Hudson-Mohawk Sheet, New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., reprinted 1973.

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28. LaFleur, R. G., "Glacial Geology of the Troy New York Quadrangles", New York State Museum and Science Service, University of the State of N.Y., State Education Dept., Albany, N.Y., 1965.

APPENDIX F

AVAILABLE ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

APPENDIX F

SECTION F1

LOCATION OF AVAILABLE ENGINEERING DATA AND RECORDS

1. Owner: City of Troy
Department of Public Utilities
55 Leversee Road
Troy, NY 12182
Attn: Richard W. Casey, Commissioner
(518) 270-4500

Available: Water Commissioners Reports, bathymetric map, History of Troy Water Works.

2. Designer: Barton and Fuller Engineers (no longer in business)

3. Construction Contractor: Unknown.

4. Agency: NYS Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233
Attn: George Koch, P.E., Chief, Dam Safety Section
(518) 457-5557

Available: Inspection reports, old photos, letters.

NYS Department of Environmental Conservation
Division of Fish & Wildlife
50 Wolf Road
Albany, NY 12233
Attn: Patrick Festa, Supervising Aquatic Biologist
(518) 457-6937

Available: Data on the lake.

4585

PHASE I INSPECTION

CHECKLIST FOR GENERAL ENGINEERING DATA
& INTERVIEW WITH DAM OWNER

Name of Dam BRADLEY LAKE DAM Fed. Id.# NY00755

Date JUNE 9, 1981 Interviewer(s) EDWIN VOPELAK JR.

Dam Owner/Representative(s) Interviewed, Title & Phone#
MR. RICHARD W. CASEY, COMMISSIONER OF DEPT. OF PUBLIC UTILITIES, CITY OF TROY, (518) 270-4500
MR. NEIL BONESTEEL, DEPT. OF PUBLIC UTILITIES, CITY OF TROY, (518) 270-4510
MR. ROBERT WEAVER, COMMISSIONER OF DEPT. OF PARKS & RECREATION, CITY OF TROY, (518) 270-4550
MR. CHARLES SMITH, MAINTENANCE SUPERVISOR, DEPT. OF PARKS & RECREATION, CITY OF TROY, (518) 270-4554

1. OWNERSHIP (name, title, address & phone #)
CITY OF TROY, CITY HALL MONUMENT SQUARE, TROY, N.Y. 12180
ATTN: JOHN P. BUCKLEY, CITY MANAGER (518) 270-4401
ALSO: MR. RICHARD W. CASEY, COMMISSIONER OF DEPT. OF PUBLIC UTILITIES
55 LEVERSEE ROAD, TROY, NEW YORK 12182 (518) 270-4500

2. OPERATOR (name, title, address & phone # of person responsible for day-to-day operation) DAM IS UNDER OPERATIONAL JURISDICTION OF DEPARTMENT OF PUBLIC UTILITIES, CITY OF TROY. OPERATING FACILITIES HAVE NOT BEEN USED FOR MANY YEARS.

   a. Operator Full/Part time NONE

3. PURPOSE OF DAM

   a. Past WATER SUPPLY FOR CITY OF TROY (ABANDONED FOR THIS USE IN 1916)

   b. Present RECREATIONAL (AESTHETIC) USES. LAKE IS NOW PART OF FREAR PARK.

4. DESIGN DATA

   a. Designed When 1859

   b. By (name, address, phone #, business status)
   BARTON & FULLER ENGINEERS (NO LONGER IN BUSINESS)

   c. Geology Reports NONE KNOWN. FOUNDATION DESCRIBED AS SLATE ROCK ("INDURATED CLAY-SHALE & COMPACT LIME-STONE... BENT & CORRUGATED) SEE APPENDICES F3-2 & F3-3.

   d. Subsurface Investigations NONE KNOWN.

   e. Design Reports/Computations (H&H, stability, seepage)
   NONE KNOWN.

4591

f. Design Drawings (plans, sections, details) NONE KNOWN.

BATHYMETRIC MAP OF RESEVOIR DATED JUNE 1894 (SEE APPENDIX G-1)

g. Design Specifications NONE KNOWN.

h. Other EXCERPTS FROM VARIOUS WATER COMMISSIONERS REPORTS (SEE APPENDICES F3-1 TO F3-8) DESCRIBING DAM DESIGN, CONSTRUCTION, MODIFICATIONS, & REPAIRS (ALL PRE-1900).

5. CONSTRUCTION HISTORY

a. Initial Construction

1) Completed When 1860

2) By (name, address, phone #, business status)

UNKNOWN

3) Borrow Sources/Material Tests APPENDIX F3-3 DESCRIBES EMBANKMENT AS "MADE OF MATERIAL FROM WITHIN FLOW LINE OF RESERVOIR, AND IS COMPOSED OF CLAY, GRAVEL & LOAM."

4) Construction Reports/Photos NONE KNOWN.

5) Diversion Scheme/Construction Sequence

NONE KNOWN.

6) Construction Problems

NO DATA.

7) As-Built Drawings (plans, sections, details)

NONE KNOWN.

8) Data on Electrical & Mechanical Equipment Affecting Safe Operation of Dam NO DATA ON MECHANICAL EQUIPMENT. NO ELECTRICAL EQUIPMENT AT SITE.

9) Other N/A.

4576

b. Modifications (review design data & initial construction items as applicable & describe) FROM WATER COMMISSIONERS REPORTS

- 1870 - DROP INLET STRUCTURE OF BRICK MASONRY W/ WOODEN GATE HOUSE ADDED TO DAM. OUTLET CULVERT OF BRICK ABOUT 6½'W×6'H + 144' LONG W/ WOOD CONDUIT AT END TO WRIGHT LAKE ALSO 20" DIA VALVED CIP FROM VALVE CHAMBER U/S OF DROP INLET + 75' LONG. SEE APPENDIX F3-7.
- 1884 - WOODEN PORTION OF OUTLET CULVERT AT D/S END COMPLETELY REPLACED W/ 6' DIA BRICK CULVERT + STONE HEADWALL AT D/S RESERVOIR SEE APPENDIX F3-7.

c. Repairs & Maintenance (review design data & initial construction items as applicable & describe)

- WATER COMMISSIONERS REPORTS (THOSE FROM PRE-ROD) INDICATE THAT DAM + APPURTENANCES WERE OPERATED + MAINTAINED.
- DAM ABANDONED AS WATER SUPPLY IN 1916. (FROM HISTORY OF TROY WATER WORKS, NOT APPENDED)
- WOODEN GATE HOUSE OVER DROP INLET + VALVE CHAMBER BURNT DOWN IN MID 1960'S BY CITY.
- DEPT. OF PARKS + RECREATION HAS CARED FOR (ALTHOUGH NOT OPERATED DAM) IN RECENT PAST (SEE 9-OTHER)

6. OPERATION RECORD

a. Past Inspections (dates, by, authority, results)

- JUNE 20, 1921, by NYS CONS. COMMISSION. (SEE APPENDIX F3-9 FOR REPORT + PHOTOS).
- DECEMBER 8, 1970 by NYS-DEC (SEE APPENDICES F3-14 TO F3-21 FOR REPORT + FOLLOW-UP CORRESPONDENCE)
- DECEMBER 12, 1974 by NYSDEC (SEE APPENDICES F3-22)
- APRIL 28, 1978 by NYS-DEC (SEE APPENDICES F3-24 TO F3-26 FOR REPORT + LETTER).

b. Performance Observations (seepage, erosion, settlement, post-construction surveys, instrumentation & monitoring records) 1970 INSPECTION STATED "EMBANKMENT SHOWED EVIDENCE OF PREVIOUS HIGH WATER + EROSION DUE TO OVERTOPPING." FEBRUARY 1861 WATER FLOWED OVER LOW GROUND TO LEFT OF DAM (APPENDIX F3-6)

c. Post-Construction Engineering Studies/Reports

NONE KNOWN.

d. Routine Rainfall, Reservoir Levels & Discharges RAINFALL + TEMPERATURE READINGS TAKEN BY DEPT. OF PUBLIC UTILITIES AT CHLORINATION STATION FOR WATER FROM TOMHANNOCK AT MELROSE. 10-15 YEARS OF RECORD @ WATER PLANT, LOCATION OF EARLIER RECORDS IS NOT KNOWN.

4564

e. Past Floods That Threatened Safety (when, cause, discharge, max. pool elevation, any damage)

SEE 6b)

f. Previous Failures (when, cause, describe)

SEE 6b)

g. Earthquake History (seismic activity in vicinity of dam)

NONE KNOWN. THERE ARE FAULTS AT DAM SITE.

7. VALIDITY OF DESIGN, CONSTRUCTION & OPERATION RECORDS (note any apparent inconsistencies)

LIMITED DATA AVAILABLE APPEARS VALID EXCEPT:

CULVERT SPILLWAY MEASURED 4'x5.5' NOT 4'x5' AS IN APPENDIX F3-6

ELEVATION BASE OF BATHYMETRIC MAP (APPENDIX G-1) IS 1.2' LOWER THAN NGVD BASED ON USGS MAPPING.

8. OPERATION & MAINTENANCE PROCEDURES

a. Operation Procedures in writing? NO Obtain copy or describe. (reservoir regulation plan, normal pool elevation and status of operating facilities, who operates & means of communication to controller, mode of operating facilities, i.e., manual, automatic, remote)

• DAM FACILITIES HAVE NOT BEEN OPERATED IN MANY YEARS.

• WATER LEVEL USUALLY AT SERVICE SPILLWAY CREST BOTH SPILLWAYS ALWAYS OPENED W/ ALL OTHER GATES + VALVES CLOSED (HAVE NOT BEEN USED IN MANY YEARS).

b. Maintenance Procedures in writing? NO Obtain copy or describe.

CITY OF TROY DEPT. OF PARKS + RECREATION MAINTAINS GROUNDS AROUND DAM SINCE IT IS LOCATED IN FREAR PARK. SEE 5c) UNDER 7. OTHER.

2425

c. Emergency Action Plan & Warning System in Writing? No
Obtain copy or describe. (actions to be taken to minimize the D/S effects of an emergency)

NO EMERGENCY ACTION PLAN & WARNING SYSTEM

9. OTHER

REPAIRS & MAINTENANCE

5c) • 1977 - TRASH RACK OF 2"x 4" LUMBER & CHAINK LINK FENCE PLACED OVER TOP OF DROP INLET.

• 1980 - GOLF CART PATH ON CREST OF DAM WAS PAVED.

• BRUSH CUT ON U/S SIDE OF DAM BY DEPT. OF PARKS & RECREATION ANNUALLY. DEBRIS ALSO REMOVED FROM RESERVOIR.

APPENDIX F

SECTION F3

COPIES OF ENGINEERING DATA AND RECORDS

TABLE OF CONTENTS

OWNER

F3-1

For search as to title,.....		$48 85
" Land,.....		2,693 00
" Labor in laying pipe, and on account of new dam,.....		3,243 09
		$8,783 43

The construction consists of—

1,172 ft. 8 inch pipe in North Third street, from Hoosic to Rensselaer street connecting with 8 inch pipe in North Third, laid in 1856.
One 8 inch and one 6 inch stop-cock.
One fire plug, corner Vanderheyden and No. Third.
One fire plug, corner Jay and North Third.

234 ft. 4 inch pipe in Adams street, between Second and Third streets.
One 4 inch stop-cock.

410 ft. 4 inch pipe in Adams, from Fourth to Hill streets.
One 4 inch stop-cock, corner Fourth and Adams.

708 ft. 4 inch pipe in Hill street, extending about 100 ft. south of, and 600 ft. north of Adams street.

368 ft. 4 inch pipe in Washington street, from Hill to the alley between Fifth and Sixth streets.
One 4 inch stop-cock, corner Washington and Hill.

325 ft. 3 inch pipe in the alley between Fifth and Sixth streets, from Washington to Liberty streets.

3,217 ft. Cost, $2,130 61.

Also of a new Reservoir, partially finished, upon which has been expended, to the close of the fiscal year, thus:

To Titus Eddy, for 3 96-100 acres land,.....	$1,584 00
" " " " removing his farm house from the land purchased,.....	275 00
" Gary Brothers, for 4 17-100 acres land,.....	1,859 00
" Robert P. Winne, 2 43-100 acres land, on acc't	100 00
" Contractor for building the dam, on acc't,...	1,653 22

1860 BL

To Barton & Fuller, for surveys, maps and engineering,.....	$775 00
" Superintending work on dam,.....	175 00
" County Clerk for search as to titles,.....	48 85
" Pig lead,.....	62 34
" 150 ft. 8 inch iron pipe,.....	112 50
" 300 ft. 12 inch iron pipe,.....	656 06
" One 8 inch stop-cock,.....	45 00
" Two 12 inch stop-cocks,.....	120 00
" Other expenses, contingent,.....	36 85
Cost of new reservoir, thus far,.....	$6,652 82

The land, in one body, for the reservoir, consists of 10 56-100 acres. In addition to this, there is $\frac{3}{8}$ of an acre, included in the purchase from Messrs. Gary, a short distance below the reservoir, intended for future uses. The price agreed upon with Robert P. Winne, for the purchase from him, was $500;—one hundred only of which has been paid, as stated above. The balance, $400, secured to him by a City Bond, 6 per cent. interest annually, is to be paid whenever he removes the incumbrances upon it, and gives a clear title.

The deed from Gary Brothers bears date July 11, 1859.
" " " Titus Eddy " " " 26, "
" " " Robert P. Winne " " Feb. 13, 1860

The work of building the dam, after advertisement for proposals, was let by contract, dated Sept. 6, 1859, to the lowest bidder. The contractor agreed to finish the dam by the 1st of December following, which he failed to do; only about one-half of the work being then done. The cold weather at that time coming on, the work was necessarily suspended. At the date of this report it is not decided whether the contractor will go on and finish the dam, or whether he will surrender the contract, and the Commissioners provide other means of completing the work.

The following, by WILLIAM BARTON, Esq., engineer of the work, is a description of the dam, and also an account of the water passing down the stream in October:

DAM FOR NEW RESERVOIR.

This new storing reservoir is situated about fifty rods east of Oakwood Avenue, on the Piscawen creek, upon lands purchased of Titus Eddy, Gary Brothers, and Robert P. Winne, embracing by the present purchase about eleven acres of land.

The reservoir when complete and filled to top water line, will contain about *thirty-seven million gallons of water*, and flow about six and a half acres of land.

The site for the embankment forming the dam, is at a place where nature seems to have supported a similar structure in by-gone days; the sides and bottom of the ravine being formed of slate rock, whose projections were at a closer proxomity here than any other, and requiring but little effort of art to make a thorough and substantial dam.

At this point the rock-sections, consisting of alternate strata of indurated clay-shale and compact lime-stone, exhibit some very remarkable and highly interesting examples of contortions and flexures—proving most conclusively, that at some period, after the deposition and formation of the rock, it had been subjected to intense lateral pressure, whereby the strata have been bent and corrugated at sharp angles, and in some instances completely reversed, so that what were originally the surface beds, are now the undermost. The most curious portions of these disturbed strata are now concealed from inspection by the earth-work of the dam, but at a point on the north bank, a little below the dam, a section still remains exposed, which will well repay a visit and examination.

The embankment formed at the dam will be about one hundred and sixty-five feet wide at the bottom, in the

deepest part of the ravine, twenty feet wide at top, about thirty-five feet long on bottom and two hundred and seventy feet long on top. The slope of the embankment on the inside will be two horizontal to one vertical; the outside slope, one and one-half horizontal to one vertical, and the embankment carried up to a point about five feet above the top water line. The deepest part of the embankment will be forty-nine feet, and the greatest depth of water thirty-four feet, which will be at the entrance to the pipes.

There are three cast-iron pipes laid from the foot of the inner slope, and extending under said embankment about 140 feet, entering a pipe chamber which has been constructed under the outer slope to receive the water passing through the pipes. This chamber is built of stone masonry, arched with brick; being eight feet wide, sixteen feet long, and about nine feet high. The bottom of the chamber is about two feet below the outlet, leaving always two feet of water into which the water from the stop-cocks is discharged, thence passing out into the creek below the dam. The pipes are two twelve inch and one eight inch, in diameter, and provided with suitable stop-cocks at the inner side of the pipe chamber, so as to control the discharge. These can, at all times, be approached by a door from near the foot of the western, or outer slope, and upon a flooring constructed over the water way, to the back part of the chamber. The pipes have been laid with great care, upon a bench or shelf cut into the rock, on the north side of the ravine, bedded on about one foot of puddled earth, and well covered with the same material. At a point about fifty-three feet westerly from the upper end of the pipes, a cast-iron flange of about three and a half feet wide, was placed on each pipe, and well leaded on, so as to more effectually prevent the water from following the outer surface of the pipe under the embankment. The pipes are laid nearly on a straight line, their upper ends only inclin-

ing a little to the south. The foot of the western, or outer slope, is shortened and sustained by a wall of stone masonry, resting upon rock; the wall is about eleven feet high, four and a half feet thick, and about thirty-six feet long at top. Through this wall is the entrance to the pipe chamber, well protected from frost by a set of double doors, one near the outer side, and one upon the inner side of the wall, leaving a space of about three feet between the doors.

The inner surface of the dam will be lined with two feet of good gravel, and faced with a slope or revetment wall, about one and one-half feet thick; the foot of the wall resting in a trench cut in the solid rock to receive the same. The dam or embankment is made of material obtained from within the flow line of the reservoir, and is composed of clay, gravel, and loam, being the best material to retain water, and make a tight dam. At about the centre of the embankment, a puddle wall has been begun, and will be completed as follows: a trench has been excavated in the slate rock, forming the bottom and sides of the ravine, fifteen feet wide and six feet deep, which is filled with material selected for the purpose, being one part good gravel to two parts good clay, laid in courses of six inches, then wet properly with water, and cut with shovels so as to thoroughly mix the material and form a water tight wall, which will be continued through the whole length and heighth of the dam, to a point three feet above the flow line; the base of said wall being fifteen feet wide for the first twelve feet in heigth; then thirteen feet wide for the next ten feet; then eleven feet wide for the next ten feet; then eight feet wide to a point about three feet above the flow line. A further precaution was taken to prevent the water from passing between the rock forming the bottom and sides of the ravine, and the embankments: Three trenches were excavated in the rock, each four feet wide and three feet deep: one located ten feet east of main puddle wall, one eighteen feet west of main puddle wall,

and another thirty-six feet west of main puddle wall. These trenches were filled with material same as main puddle wall, and extended up into the common embankments about five feet throughout the bottom and sides of the ravine.

A good and sufficient waste wier will be formed by an excavation in rock, about fifty feet south of the main dam, entirely disconnected therewith. The surplus water passing over this will enter the stream again about two hundred feet below the dam.

Quantity of Water.—During the first week in October a good opportunity was afforded by the passage of the water through a trough, to ascertain the quantity used at this time. A series of measurements were made by running the water into a box, constructed for the purpose, which would contain fifty-six cubic feet; the time required for filling the same being carefully noted, gave actual measure; the result being found to be 1,463,946 Winchester gallons passing in twenty-four hours down the stream into the distributing reservoir; thence into the pipes for the supply of the city.

COST OF THE WATER WORKS.

The entire cost to March 1859, was.....	$207,208 46
Add for construction this year,.....	8,783 43
Total cost of construction to March, 1860,	$215,991 89

WATER WORKS DEBT.

There was due on this debt, at the commencement of the fiscal year, in March, 1859,..	$90,000 00
Paid on the debt, in 1859,.....	9,000 00
Due March, 1860,.....	$81,000 00

The payments for interest, salaries, labor, materials, and all ordinary expenses of maintaining the Works during these six years were.....	$71,131 91	
Surplus earnings during the same time,.	61,105 15	—$132,237 06

Of these surplus earnings there has been expended:

For New Reservoir,.....	$15,669 43	
For Force Pump,.....	1,062 18	
For Iron Pipe and Street Mains,.....	34,401 08	
Expended,.....	$51,132 69	
In Chamberlain's Office unexpended, ..	9,972 46	—$61,105 15

The Street Mains laid in the six years, consist of:

325 feet 3 inch pipe.
2,642 feet 4 inch pipe.
821 feet 6 inch pipe.
5,075 feet 8 inch pipe.
4,022 feet 20 inch pipe.

12,885 feet, equal to 2 miles, 2,325 feet, nearly 2½ miles.
19 stop-cocks, of different sizes.
16 fire plugs.

That our citizens and tax payers may understand and appreciate the difference in the workings of the old system and the new, introduced in 1855, we state that a careful examination of the Chamberlain's Reports for *ten consecutive years*, ending with the fiscal year in March, 1854, published in our *First Annual Report*, showed that for these ten years the average expenses, interest included, per year, were ...	$14,359 23
Average receipts per year, were	10,745 10
Average deficiency per year, ...	$3,614 13

1861 BL

COST OF THE WATER WORKS.

The entire cost, to March, 1860, was		$215,991 89
Add for construction this year,.....		10,140 80
Total cost of construction to March, 1861,.....		$226,132 69

WATER WORKS DEBT.

This debt, in 1855, when we took charge of the Works, was $100,000. There was paid upon it in May, 1857, $10,000; in May, 1860, $10,000, and $9,000 of the bonds, held by the Commissioners of the Sinking Fund, cancelled. The money for these payments was raised $2,500 a year in the taxes, as provided by law, for a Sinking Fund, and from the rent of the Female Seminary.

There remains due $71,000 00

This is payable:

May 1, 1863,.....	$10,000 00	
May 1, 1866,.....	10,000 00	
May 1, 1869,.....	10,000 00	
May 1, 1872,.....	6,000 00	
May 1, 1875,.....	15,000 00	
May 1, 1880,.....	20,000 00	
		$71,000 00

Interest 5 per cent., semi-annual.

THE NEW RESERVOIR.

This is situated on the Piscawen Creek, about fifty rods east of Oakwood Avenue, and about half a mile east of the Distributing Reservoir. It was commenced in September, 1859, and as before stated, but partly finished in that year. The land purchased for its site was ten and fifty-six one hundredths acres, and when full to top water line, the flow will be about eight acres. The water in the deepest part is *thirty-five feet*, and the average depth from

fifteen to eighteen feet. It was finished, except the waste-wier, and this shortly thereafter, by the first of July, 1860, and will contain *forty million gallons.*

A full description of the manner in which the dam is built, after the most approved plan of building earth dams, was published in our last Annual Report. We copy so much thereof as is necessary to give, briefly, the substance:

"The embankment formed at the dam will be about one hundred and sixty-five feet wide at the bottom, in the deepest part of the ravine, twenty feet wide at top, about thirty-five feet long on bottom, and two hundred and seventy feet long on top. The slope of the embankment on the inside will be two horizontal, to one vertical; the outside slope, one and one-half horizontal, to one vertical, and the embankment carried up to a point about five feet above the top water line. The deepest part of the embankment will be forty-nine feet, and the greatest depth of water thirty-five feet, which will be at the entrance to the pipes.

There are three cast-iron pipes laid from the foot of the inner slope, and extending under said embankment about one hundred and forty feet, entering a pipe chamber which has been constructed under the outer slope to receive the water passing through the pipes. This chamber is built of stone masonry, arched with brick; being eight feet wide, sixteen feet long, and about nine feet high. The bottom of the chamber is about two feet below the outlet, leaving always two feet of water into which the water from the stop-cocks is discharged, thence passing out into the creek below the dam. The pipes are two twelve inch and one eight inch, in diameter, and provided with suitable stop-cocks at the inner side of the pipe chamber, so as to control the discharge. These can, at all times, be approached by a door from near the foot of the western,

or outer slope, and upon a flooring constructed over the water-way, to the back part of the chamber. The pipes have been laid with great care, upon a bench or shelf, cut into the rock, on the north side of the ravine, bedded on about one foot of puddled earth, and well covered with the same material. At a point about fifty-three feet westerly from the upper end of the pipes, a cast-iron flange of about three and a half feet wide, was placed on each pipe, and well leaded on, so as to more effectually prevent the water from following the outer surface of the pipe under the embankment. The pipes are laid nearly on a straight line, their upper ends only inclining a little to the south. The foot of the western, or outer slope, is shortened, and sustained by a wall of stone masonry, resting upon a rock. The wall is about eleven feet high, four and a half feet thick, and about thirty-six feet long at top. Through this wall is the entrance to the pipe chamber, well protected from frost by a set of double doors, one near the outer side, and one upon the inner side of the wall, leaving a space of about three feet between the doors.

The inner surface of the dam will be lined with two feet of good gravel, and faced with a slope or revetment wall, about one and one-half feet thick; the foot of the wall resting in a trench cut in the solid rock to receive the same. The dam or embankment is made of material obtained from within the flow line of the reservoir, and is composed of clay, gravel, and loam, being the best material to retain water, and make a tight dam. At about the centre of the embankment, a puddle wall has been begun, and will be completed as follows: A trench has been excavated in the slate rock, forming the bottom and sides of the ravine, fifteen feet wide and six feet deep, which is filled with material selected for the purpose, being one part good gravel to two parts good clay, laid in courses of six inches, then wet properly with water, and cut with shovels so as

to thoroughly mix the material and form a water tight wall, which will be continued through the whole length and heighth of the dam, to a point three feet above the flow line; the base of said wall being fifteen feet wide for the first twelve feet in heighth; then thirteen feet wide for the next ten feet; then eleven feet wide for the next ten feet; then eight feet wide to a point about three feet above the flow line. A further precaution was taken to prevent the water from passing between the rock forming the bottom and sides of the ravine, and the embankments. Three trenches were excavated in the rock, each four feet wide, and three feet deep—one located ten feet east of main puddle wall, one eighteen feet west of main puddle wall, and another thirty-six feet west of main puddle wall. These trenches were filled with material same as main puddle wall, and extended up into the common embankments about five feet throughout the bottom and sides of the ravine."

As the water which supplied the city came from the rivulets and lakes in Brunswick and passed through the pipes in this dam, and the season remarkably dry and water low, no surplus was accumulated in this Reservoir till the latter part of August, at which time it became full. From that time, during all the fall and winter, it has supplied the city, continued full, and discharged, almost daily, a surplus over the waste-wier, *and this without drawing from the lakes in Brunswick.* At the time of the thaw and freshet in February, the pipes in the dam, two twelve inch, and one eight inch, and the waste-wier, a circular brick sewer, four by five feet in diameter, were not sufficient to pass off the water, and it made its way over the ground on the south side of the dam. The surplus water, which thus passed off to the Hudson, during two days, was probably sufficient to fill *two additional* Reservoirs of the size of this new one.

1861 BL

The capacity of the Piscawen Creek and its tributary springs and rivulets, to supply the city with water, can be fully and fairly tested only by building additional Reservoirs as often as needed, and as long as there is surplus water to fill them.

THE FORCE PUMP.

In the fall of 1859, seeing that the new dam would not be finished in December, at the time limited by the contract, and apprehensive that there might be a short supply of water in the spring and summer of 1860, before the dam could be completed and filled, we purchased twelve inch iron pipe to be used if occasion required, for a pump at the Hydraulic Canal, near the State Dam, and in the winter of 1860 made inquires for purchasing a lot on said canal, or hiring the necessary power. It became evident in the spring of 1860—the fall, winter and spring being very dry, and the lake in Brunswick in April not full—that a pump would be useful, perhaps absolutely necessary as an auxiliary, in providing the requisite quantity of water for the use of the city during the summer. Accordingly we made the usual application to the Common Council for the income of the Water Works for the purposes specified in our application, and that the subject may be clearly understood, we copy from the records of the Common Council the proceedings of that body in reference thereto, running through several meetings, till finally, July 2, the appropriation was granted:

[Special Meeting, May 22, 1860.]

The Mayor stated the object of the meeting to be the consideration of a communication which he had received from the Water Commissioners, as follows:

on them for the extinguishment of fires or for any other purpose.

It is contemplated to further extend this same line, fully believing that the wants of the city and the interest of the water works demand such extension.

New Well and Well House.

Experience has furnished abundant evidence of the advantages of passing water from one reservoir to another by means of a well rather than by the method first adopted by these works. By means of the well, economy and safety are better secured, and the water in passing over the waste wier at the top of the well, rather than through gates at or near the bottom of the reservoir, is furnished in greater purity—all impurities very soon settling to the bottom whenever the water may have become turbid in consequence of a heavy rain-fall and freshet.

Having occasion in the spring of 1870 to make some repairs and improvements at the *second reservoir east* of Oakwood Avenue, it was considered advisable to improve that opportunity by constructing therein a well and well-house. A large culvert was therefore laid with hard brick and Rosendale cement, having an inside perpendicular diameter of six and a half feet, and a cross diameter of six feet extending toward the Oakwood reservoir about two hundred feet and from its terminus a wood conduit then communicates with that reservior. Upon the upper end of the culvert and within the reservoir is built the well of brick, being 20 by 22 feet square, and its walls extending to the surface of water in the lake. It has two compartments, one being 12 feet in length by 8 feet in width, the other 12 by 4 feet. The top of the walls of the well is covered by hewn stone, beveled off for a waste. These coping-stones are kept in position by iron bolts which

have previously been secured in the walls below. At and upon each of the corners of the well a pier is built, and upon these piers the well-house, of wood, is erected, which house connects with the land by means of a platform.

From the largest compartment above mentioned, and within the culvert, a twenty inch iron pipe extends about 75 feet. This pipe comes out of the culvert with the largest possible radius. A 20-inch stop valve is placed in the upper extremity of this line of pipe, which is governed by an iron rod and screw connected therewith, and extending into the well-house, where, also in like manner, are the gates within the well controlled. It may here be remarked that from the terminus of the iron pipe, above mentioned, a new main may, at some future day, be extended through the higher portions of our city, by which some of our citizens, heretofore unsupplied from our works, may obtain their full supply of water. By observation, the level line of the well passes between the upper range of windows and the eaves of St. Joseph's Theological Seminary, on Ida Hill.

Fire Plugs.

Entertaining a strong conviction of the inexediency of longer continuing the farther manufacture and use of the old style fire-plug with the wooden case, formerly put up and used by these works, we are disposing of that stock by placing them in localities where their use is not likely to be much or often required. During the past season we have put in eight new iron fire-plugs, all having a four inch discharge and the proper connections to accommodate our fire steamers. Some of these plugs were placed in position along the line of twenty inch main, then being laid.

Our experience in the use of the iron fire-plug is en-

OWNER

F3-8

dam there was still another leak, which was found to come from a fracture in the 24-inch supply main behind and close to the rear of the wall. The cause of this fracture is conjectural—being due either to a crack or defect in the pipe, or to the water-ram caused by the action of the air in the frequent opening and shutting of the valves in the well house, or possibly to both causes combined. The broken pipe was taken out and replaced with a new one. In making these repairs some portion of the puddle removed in the course of the work was found to be of inferior and unsuitable character. This was thrown out, and in restoring the work only the best material obtainable was employed. The surface of all rock sides was broken, so as to enable a close and secure jointage with the puddle. A masonry wall was built diagonally across and enclosing the 12 and 30-inch pipes and connected with the main cut-off wall, and every possible effort made both to stop the leaks and prevent a recurrence of them. The work, though entirely successful, was necessarily difficult and expensive, having cost for cement $40.50, for team work $174, for labor $770.75, and for iron pipe and sleeve $68, making a total cost of $1,053.25. The only leak now noticeable is along the south foot of the embankment. It is probably due to filtration through the underlying slate rock, and consequently need not be a source of apprehension.

The high service reservoir received, last year, a very thorough grubbing and cleaning. It was not, in fact, properly and thoroughly grubbed out at the time of its construction in 1879, and with the subsequent alluvial deposits from the flow of the stream, it necessitated a considerable expenditure to put it in proper condition. The imperfect provision originally made for protecting the mouth of the 12-inch inlet pipe from the middle compartment was removed and a large and suitable copper screen set in place of it. The brick work of the well-house was also repaired. The cost of the screen and well-house repairs was $40.88, cleaning and grubbing $403.86, total $444.74. The new bridge on the Brunswick Highway, crossing this reservoir

at its upper or eastern extremity, was placed there by the Brunswick Highway Commissioners. A claim of damages by the Brunswick authorities for injury to the old bridge, by the backing up of the water from the reservoir, was satisfactorily adjusted by the payment from this Board of two hundred dollars towards the building of the new bridge and allowing the Board to dictate some important features of its construction. As a result of this arrangement, the bridge was substantially constructed of stone, with a capacious waterway amply sufficient to take the stream at its highest pitch, and forms now a very useful and appropriate termination of the reservoir itself.

A very necessary work has been done in removing the wooden portion of the culvert by which the flood-water is passed from upper to lower Oakwood reservoir, and replacing it with a substantial structure of brick, with a circular waterway of six feet in diameter. It is in fact a continuation of the old brick culvert constructed in 1870 (which was about 144 feet in length), and extends from that point about 220 feet to lower Oakwood, where it terminates in a substantial head-wall built of Glens Falls limestone. The wooden portion of the old culvert was 14 years old, and had become, from various causes, a complete and useless wreck, the necessary result of which was to fill up to a considerable extent the eastern end of lower Oakwood reservoir with the wash from the earth beneath the bottom of the old culvert. While the pond was drawn down in order to lay the foundation of the head-wall, these deposits were removed and used in grading and filling over the new portion of the culvert. The total cost of the new culvert, including levelling, grading and the stone head-wall was $2,399.12. The items of this expenditure will be found under their proper head in construction account.

The construction of a fence around that portion of the city property lying to the eastward of Oakwood Avenue, which was begun in 1882, was resumed last summer, and brought very nearly to completion, 7,935 feet of substantial

Form W51. 5-12-16-2000 (16-16758) Acc. 382

(NOTICE: After filling out one of these forms as completely as possible for each dam in your district, return it at once to the Conservation Commission, Albany.)

STATE OF NEW YORK
CONSERVATION COMMISSION
ALBANY

Bill Curley

DAM REPORT

Frier Park

June 20 (Date), 1921

CONSERVATION COMMISSION,

DIVISION OF WATERS. S-224 14C U Hudson

GENTLEMEN:

I have the honor to make the following report in relation to the structure known as the Old Reservoir No 3 Dam.

This dam is situated upon the ..... (Give name of stream)

in the ~~Town~~ City of Troy, Rensselaer County,

about ..... (State distance) from the Village or City of .....

The distance down (Up or down) stream from the dam, to ~~the~~ Oakwood ave (Give name of nearest important stream or of a bridge),

is about 1 mile (State distance).

The dam is now owned by City of Troy (Give name and address in full)

and was built in or about the year ....., and was extensively repaired or reconstructed during the year .....

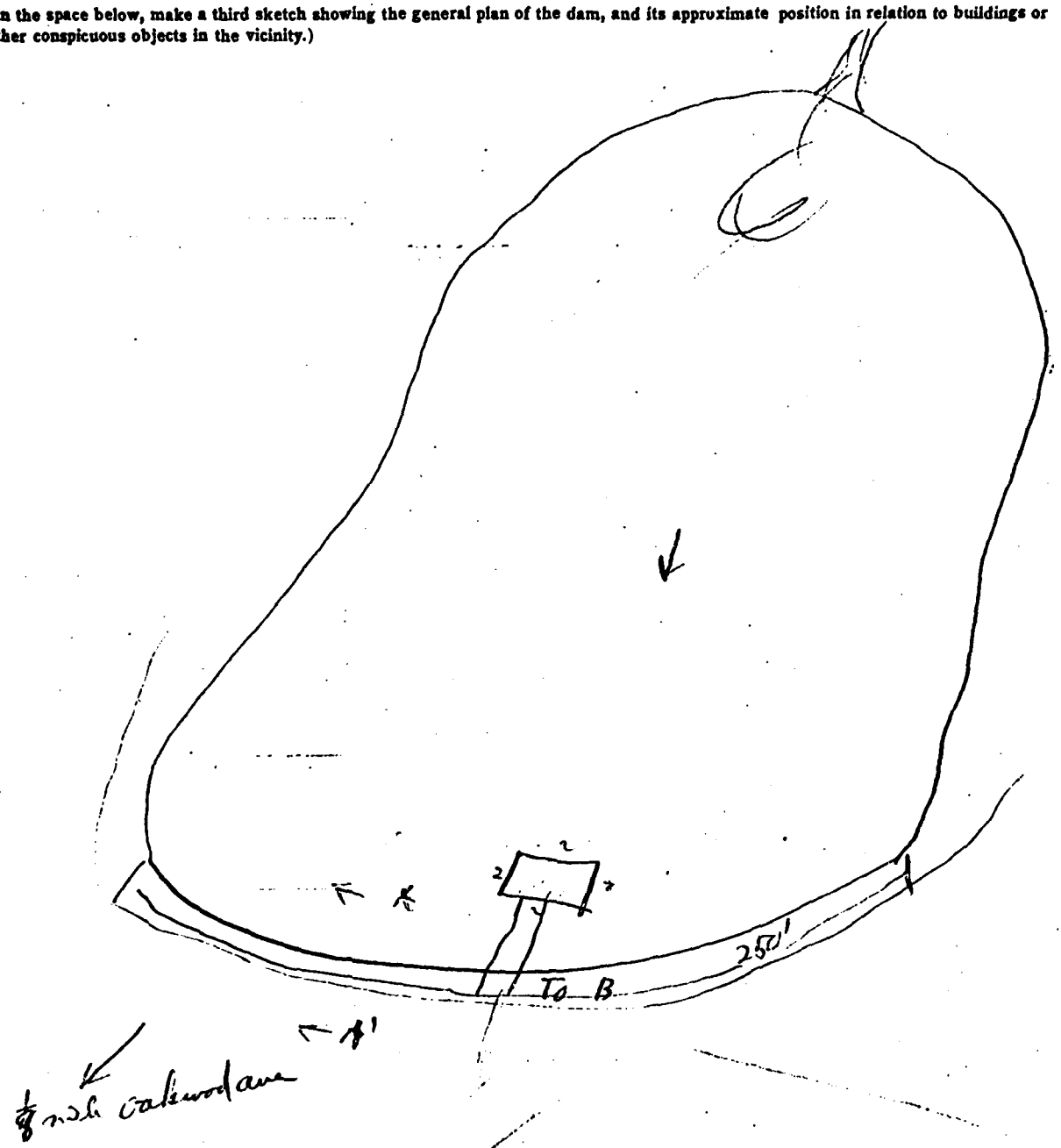
As it now stands, the spillway portion of this dam is built of earth (State whether of masonry, concrete or timber)

and the other portions are built of masonry (State whether of masonry, concrete, earth or timber with or without rock fill)

As nearly as I can learn, the character of the foundation bed under the spillway portion of the dam is gravel and under the remaining portions such foundation bed is .....

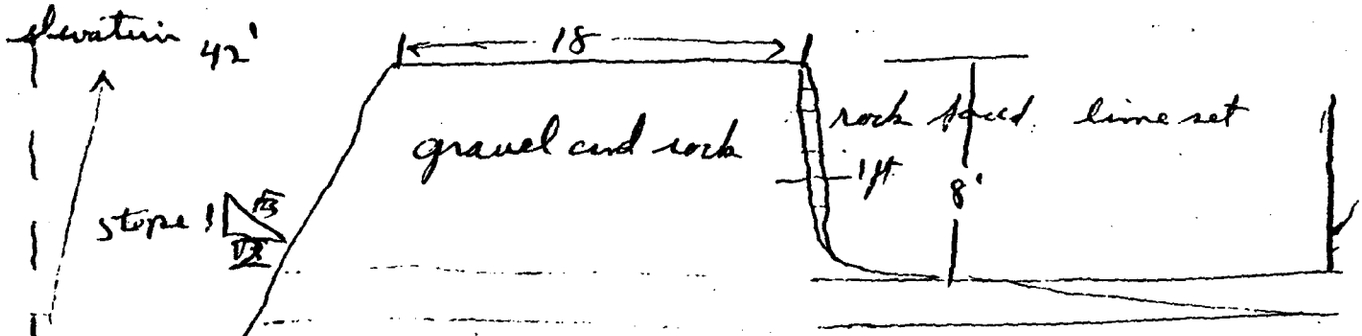
DEC

(In the space below, make a third sketch showing the general plan of the dam, and its approximate position in relation to buildings or other conspicuous objects in the vicinity.)



DEC

(In the space below, make one sketch showing the form and dimensions of a cross section through the spillway or waste-weir of this dam and outline the abutment, and a second sketch showing the same information for a cross section through the other portion of the dam. Show particularly the greatest height of the dam above the stream bed, its thickness at the top, and thickness at the bottom, as nearly as you can learn.)



DEC

The total length of this dam is 257' feet. The spillway or waste-weir portion, is about 8' feet long, and the crest of the spillway is about feet below the abutment.

The number, size and location of discharge pipes, waste pipes or gates which may be used for drawing off the water from behind the dam, are as follows: one 4" pipe to B.

At the time of this inspection the water level above the dam was 2 ft. in. below ~~above~~ the crest of the spillway.

(State briefly, in the space below, whether, in your judgment, this dam is in good condition, or bad condition, describing particularly any leaks or cracks or erosions which you may have observed.)

Dam is in good condition.

Reported by D. L. Baxter
(Signature)

137 Furman St
(Address—Street and number, P. O. Box or R. F. D. route)

Syracuse NY
(Name of place)

DEC

A- Bradley Lake Dam from upstream - 6/20/21

B- Control tower looking toward left abutment - 6/20/21

DER DAM INSPECTION REPORT UNDATE

RB	CTY	YR AP.	DAM NO.	INS. DATE	USE	TYPE
02	42	01	00014C	08/27/0	02	2

AS BUILT INSPECTION

1 Location of Sp'way and outlet	1 Elevations
1 Size of Sp'way and Outlet	1 Geometry of Non-overflow section

GENERAL CONDITION OF NON-OVERFLOW SECTION

1

2 Settlement	1 Cracks	2 Deflections
1 Joints	1 Surface of Concrete	1 Leakage
2 Undermining	2 Settlement of Embankment	2 Crest of Dam
2 Downstream Slope TREES	1 Upstream Slope	2 Toe of Slope

GENERAL COND. OF SP'WAY AND OUTLET WORKS

1

2 Auxiliary Spillway	2 Service or Concrete Sp'way	1 Stilling Basin
2 Joints	2 Surface of Concrete	2 Spillway Toe
4 Mechanical Equipment	4 Plunge Pool	4 Drain

1 Maintenance	B Hazard Class
10 Evaluation	34 Inspector

COMMENTS:

1. TREES DOWNSTREAM SLOPE.
2. CREST OF DAM ERODING
3. NO PROTECTIVE COVER ON D.I.

DEC

DEC DAM INSPECTION REPORT CODING

1. River Basin - Nos. 1-23 on Compilation Sheets
2. County - Nos. 1-62 Alphabetically
3. Year Approved -
4. Inspection Date - Month, Day, Year
5. Apparent use -
   1. Fish & Wildlife Management
   2. Recreation
   3. Water Supply
   4. Power
   5. Farm
   6. No Apparent Use
6. Type -
   1. Earth with Aux. Service Spillway
   2. Earth with Single Conc. Spillway
   3. Earth with Single non-conc. Spillway
   4. Concrete
   5. Other
7. As-Built Inspection - Built substantially according to approved plans and specifications

Location of Spillway and Outlet Works

1. Appears to meet originally approved plans and specifications.
2. Not built according to plans and specifications and location appears to be detrimental to structure.
3. Not built according to plans and specifications but location does not appear to be detrimental to structure.

Elevations

1. Generally in accordance to approved plans and specifications as determined from visual inspection and use of hand level.
2. Not built according to plans and specifications and elevation changes appear to be detrimental to structure.
3. Not built according to plans and specifications but elevation changes do not appear to be detrimental to structure.

Size of Spillway and Outlet Works

1. Appears to meet orlginally approved plans and specifications as determined by field measurements using tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

Geometry of Non-overflow Structures

1. Generally in accordance to originally approved plans and specifications as determined from visual inspection and use of hand level and tape measure.
2. Not built according to plans and specifications and changes appear detrimental to structure.
3. Not built according to plans and specifications but changes do not appear detrimental to structure.

General Conditions of Non-Overflow Section

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Items) For boxes listed on condition under non-overflow section.
1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.

DEC

DEC DAM INSPECTION REPORT CODING (cont.)

General Condition of Spillway and Outlet Works

1. Adequate - No apparent repairs needed or minor repairs which can be covered by periodic maintenance.
2. Inadequate - Items in need of major repair.

(Items) For boxes listed conditions listed under spillway and outlet works.

1. Satisfactory.
2. Can be covered by periodic maintenance.
3. Unsatisfactory - Above and beyond normal maintenance.
4. Dam does not contain this feature.

Maintenance

1. Evidence of periodic maintenance being performed.
2. No evidence of periodic maintenance.
3. No longer a dam or dam no longer in use.

.S.)

Hazard Classification Downstream

1. (A) Damage to agriculture and county roads.
2. (B) Damage to private and/or public property.
3. (C) Loss of life and/or property.

Evaluation - Based on Judgment and Classification in Box Nos.

Evaluation for Unsafe Dam

1. Unsafe - Repairable.
2. Unsafe - Not Repairable.
3. Insufficient evidence to declare unsafe.

River Basins	Counties	
(1) LOWER HUDSON	1 Albany	36 Orange
(2) UPPER HUDSON	2 Allegany	37 Orleans
(3) MOHAWK	3 Bronx	38 Oswego
(4) LAKE CHAMPLAIN	4 Broome	39 Otsego
(5) DELAWARE	5 Cattaraugus	40 Putnam
(6) SUSQUEHANNA	6 Cayuga	41 Queens
(7) CHEMUNG	7 Chautauqua	42 Rensselaer
(8) OSWEGO	8 Chemung	43 Richmond
(9) GENESEE	9 Chenango	44 Rockland
(10) ALLEGHENY	10 Clinton	45 St. Lawrence
(11) LAKE ERIE	11 Columbia	46 Saratoga
(12) WESTERN LAKE ONTARIO	12 Cortland	47 Schenectady
(13) CENTRAL LAKE ONTARIO	13 Delaware	48 Schoharie
(14) EASTERN LAKE ONTARIO	14 Dutchess	49 Schuyler
(15) SALMON RIVER	15 Erie	50 Seneca
(16) BLACK RIVER	16 Essex	51 Steuben
(17) WEST ST. LAWRENCE	17 Franklin	52 Suffolk
(18) EAST ST. LAWRENCE	18 Fulton	53 Sullivan
(19) RACQUETTE RIVER	19 Genesee	54 Tioga
(20) ST. REGIS RIVER	20 Greene	55 Tompkins
(21) HOUSATONIC	21 Hamilton	56 Ulster
(22) LONG ISLAND	22 Herkimer	57 Warren
(23) OSWEGATCHIE	23 Jefferson	58 Washington
(24) GLASSE	24 Kings	59 Wayne
	25 Lewis	60 Westchester
	26 Livingston	61 Wyoming
	27 Madison	62 Yates
	28 Monroe	
	29 Montgomery	
	30 Nassau	
	31 New York	
	32 Niagara	
	33 Oneida	
	34 Onondaga	
	35 Ontario	

DEC

Eldred Rich

George Van Etten and Robert Ryczek

Dam Inspection Report

February 4, 1971

Re: D. O. T. Registered Dam No. 14C
Upper Hudson River Basin, Rensselaer County

Owner: City of Troy

On December 8, 1970 an inspection of the above dam was made by Principal Engineering Technicians George Van Etten and Robert Ryczek of this Department. This structure is approximately 250 ft. in length, 18 ft. in width constructed of gravel and rock with a masonry drop inlet. The impoundment was used originally as a water supply reservoir for the City but is now used for recreation. The following is a report of our findings on the existing condition of this dam:

1. General Condition of Non-Overflow Section

The earth embankment shows evidence of previous high water and erosion due to overtopping. There is also some deterioration of the outlet structure on the downstream slope. Large trees are growing on the downstream slope.

2. General Condition of Spillway and Outlet Works

The drop inlet was origionally covered by a masonry building which probably contained the control valves but the building is now gone leaving an opening with no protection over it. The dam below has the same situation which makes both structures dangerous to swimmers and ice skaters.

3. Evaluation and Hazard Class

The amount of water impounded by this structure is not great but immediately below this reservoir is another reservoir with a City Street immediately adjacent which would be flooded should this structure fail. This structure would have a class "B" hazard rating.

GVE:RR:erb

DEC

New York State Department of Environmental Conservation
Albany, N Y 12201

Henry L. Diamond
Commissioner

DIVISION OF RESOURCE MANAGEMENT SERVICES
BUREAU OF WATER REGULATION

December 8, 1971

City of Troy
Department of Public Utilities
55 Leversee Road
Troy, New York 12182

Attention Commissioner John P. Buckley

Gentlemen:

Re: Department of Transportation
Registered Dam No. 14C
Upper Hudson River Basin
Rensselaer County

In conformance with the Department's dam safety program, an inspection was made on the above referenced dam on December (12) 1970. → 8 presumed typo error CTM

The reported findings of that inspection are as follows:

1. This structure was originally used as a water supply reservoir for the city but is now apparently only used for recreation. The earth embankment shows evidence of erosion across the crest due to overtopping during high water. An emergency spillway of sufficient capacity should be constructed away from the fill section.

2. Large trees are growing on the downstream slope which are highly undesirable due to the damage caused by their excessive root systems.

3. The drop inlet structure originally covered by a masonry building which probably contained the control valves, is now gone leaving an opening with no protection around it. A trash rack of some sort should be provided over this opening.

4. The outlet structure on the downstream side is beginning to deteriorate and should be repaired.

Based on the above findings, we make the following recommendations:

DEC

1. We suggest that the City of Troy retain a licensed professional engineer to insepct the structure and recommend a program of rehabilitation and repair. This should be done at the earliest possible date.

2. In the event your engineer determines the condition of the structure warrants major reconstruction or repair, we must remind you that a permit is required under the Conservation Law for such works.

Very truly yours,

Robert S. Drew
Acting Central Permit Agent

cc: Mr. John Whalen

DEC

Mr. Dick Casey Engineer
270-4516

Bill Carley-
Frear Park 270-4550

New York State Department of Environmental Conservation
Albany, N Y 12201 Division of Resource Management Services
Bureau of Water Regulation

Henry L. Diamond
Commissioner

December 22, 1972

City of Troy Department of
Public Works
55 Leversee Road
Troy, New York 12182

John Willson city Engineer
270-4467
51 State St

Gentlemen:

Department of Transportation
Registered Dam No. 14C
Upper Hudson River Basin
Rensselaer County

The Department of Environmental Conservation has implemented a Dam Safety Program. The purpose of this program is to identify older dams which are in need of repair and to notify the listed owner of his responsibility. Our primary concern is to protect against the loss of life and property by downstream parties incurred by a dam failure. Another concern is the downstream water quality and the protection of the stream bed should a dam fail and large amounts of silt and debris be washed downstream.

Your dam has been inspected and you were notified of its existing condition. Our recommendations were further given to you in our letter dated **December 8, 1971.** Your liability as the owner of this dam is specified by law in the event of a dam failure which caused downstream damages. The Department also has the authority when public safety requires to invoke Section 15-0507 of the Environmental Conservation Law (formerly Section 429-e of the Conservation Law). A copy of this section is enclosed for your information.

We have not heard from you regarding what course of action will be taken to correct the present condition of your dam as outlined in our previous correspondence. As an alternative to repairing this dam if you wish to abandon the dam by permanently breaching or removing it, we would appreciate receiving this information. If you have sold this property and no longer own this dam, would you please forward this letter to the new owner.

Due to the large number of dams we have inspected and in order to reduce our work-load in sending out these letters, we have elected to contact you by this form letter. Our engineering staff is available at your request if you have any additional questions regarding the extent of the repair work to be carried out or if you want to set up a field inspection or an office conference. You may contact me either by letter or by telephone at (518) 457-7418.

Very truly yours,

Stanford Zeccolo
Senior Hydraulic Engineer

Enclosure

F3-20

cc: Mr. John Whalen
DEC

Drainage area 64 Acres
Below Grafton Res.

October 29, 1973

Mr. John Willson
City Engineer
51 State Street
Troy, New York 12182

Re: Registered Dam No. 14C
Old Reservoir No. 3
1000' Upstream of Oakwood Ave.
Frear Park, City of Troy

Dear Mr. Willson:

As you requested during our telephone conversation this morning, I am enclosing a copy of the original letter sent to the City of Troy in 1971 after an inspection of this dam on December 8, 1970.

We would meet with you at your convenience to determine what course of action should be taken to repair this structure.

Very truly yours,

George A. Van Etten
Principal Engineering Technician

GVE:bt

Encl.

DEC

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Dam Number	River Basin	Town	County	Hazard Class*	Date & Inspector
14e	Upper Hudson	Troy	Rensselaer	B	12/19/74

Type of Construction

- ☐ Earth w/concrete spillway
- ☐ Earth w/drop inlet pipe
- ☒ Earth w/stone or riprap spillway
- ☐ Concrete
- ☐ Stone
- ☐ Timber

Use

- ☐ Water Supply
- ☐ Power
- ☒ Recreation
- ☐ Fish and Wildlife
- ☐ Farm Pond
- ☐ No Apparent Use-Abandoned

Estimated Impoundment Size

- ☐ 1-5 acres
- ☒ 5-10 acres
- ☐ Over 10 acres

Estimated Height of Dam above Streambed

- ☐ Under 10 feet
- ☐ 10-25 feet
- ☒ Over 25 feet

Condition of Spillway

- ☐ Service satisfactory
- ☒ In need of repair or maintenance
- ☐ Auxiliary satisfactory
- ☒ In need of repair or maintenance

Explain: Sheuld have trash rack

Condition of Non-Overflow Section

- ☒ Satisfactory
- ☐ In need of repair or maintenance Explain: _____

Condition of Mechanical Equipment

- ☐ Satisfactory
- ☐ In need of repair or maintenance Explain: _____

none visible

Evaluation (From Visual Inspection)

- ☐ No defects observed beyond normal maintenance
- ☒ Repairs required beyond normal maintenance

DEC

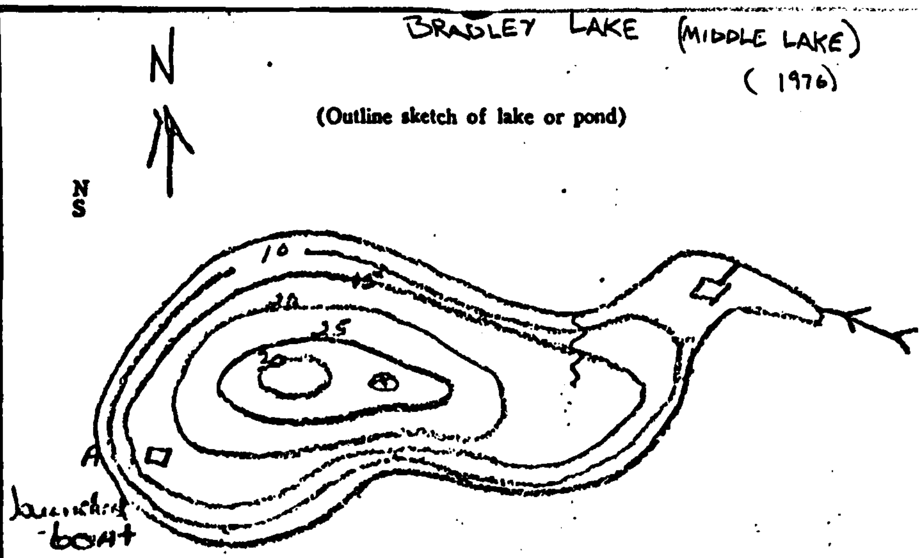
*Explain Hazard Class, if Necessary

GS-4 (10/74)

BRADLEY LAKE (MIDDLE LAKE)
(1976)

(Outline sketch of lake or pond)

N
S



☐ drain
⊗ water chemistry
~ gill net
—☐ trap net

drain pipe outflow on west shore

(Indicate principal weed beds, type of bottom and points where soundings were taken on sketch; also indicate, by numbers, points where collections were taken)

Area ......6 acres...... Elevation ......300'......

If posted: Owner's name and address ....

....

Bottom: clay, gravel, marl, <u>muck</u> 80%, rock, <u>sand</u> 20% (underline; give % of each type)

Vegetation: <u>scant</u> 10%, fair, abundant, floating, <u>submerged</u> 100% (underline; give % of each type)

Source: <u>springs in bottom</u>, spring streams, <u>surface water</u> (underline)

Shore line: <u>wooded</u>, swampy, cultivated ...... shrubbery ......

Color of water: white, light brown, brown ...... green ......

Height of dam if present ...... None ......

F3-23

NYSDEC BUREAU OF FISH & WILDLIFE

Rev. 3/77)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DAM INSPECTION REPORT
(By Visual Inspection)

Federal

Dam Number	River Basin	Town	County	Hazard Class	Date & Inspector
14C	Upper Hudson	City of Troy	Rensselaer	* C	4/28/78 BC

Stream = Bradley LAKE Owner = City of Troy

Type of Construction

- ☐ Earth w/Concrete Spillway
- ☒ Earth w/Drop Inlet Pipe
- ☐ Earth w/Stone or Riprap Spillway
- ☐ Concrete
- ☐ Stone
- ☐ Timber
- ☐ Other _____

Use

- ☐ Water Supply
- ☐ Power
- ☒ Recreation - ☐ High Density
- ☐ Fish and Wildlife
- ☐ Farm Pond
- ☐ No Apparent Use-Abandoned
- ☐ Flood Control
- ☐ Other _____

Estimated Impoundment Size 5-6 Acres### Estimated Height of Dam above Streambed 25 Ft.

Condition of Spillway

- ☐ Service satisfactory
- ☒ In need of repair or maintenance
- ☐ Auxiliary satisfactory
- ☒ In need of repair or maintenance

Explain: letter sent 5/1/78

Condition of Non-Overflow Section

- ☐ Satisfactory
- ☒ In need of repair or maintenance

Explain: letter sent 5/1/78

Condition of Mechanical Equipment

- ☐ Satisfactory
- ☐ In need of repair or maintenance

Explain: None

Siltation ☐ High ☒ Low

Explain: _____

Remarks: * C HAZARD. The outlet of this structure flows into a long lake of about the same size then underneath Cohoes Ave. (Rt. 4) and then downstream to a storm sewer and then underneath a heavily populated area in the City. It is conceivable that if the structure failed damage would occur to the urban area in the City which is about ½ mi downstream and a vertical drop of about 200'+

Evaluation (From Visual Inspection)

☒ Repairs req'd. beyond normal maint. ☐ No defects observed beyond normal maint.

DEC

May 2, 1978

Mr. Thomas Murley, City Engineer
City Hall
Troy, New York

Re: Dam #14B and 14C
Upper Hudson Watershed

Dear Mr. Murley:

Recently we inspected two dams owned by the City of Troy in Frear Park known as Wright Lake (14B) and Bradley Lake (14C). We have noted several deficiencies in these structures. Following is a listing of problem areas in each structure:

Wright Lake Structure 14B - Bordering Oakwood Ave.

1. Trees and brush are growing on the downstream slope of the embankment. This is an unacceptable practice since the extensive root system of trees can start possible leaks.

2. There isn't any emergency spillway on this structure other than a small culvert.

Bradley Lake Structure 14C - Bordering the Playground in Frear Park

1. Trees and brush are growing on the downstream slope of the embankment.

2. Logs and debris are clogging the emergency spillway.

3. The culvert through the embankment is made of red bricks. Some of these are missing and the entire culvert appears to be deteriorating. The outlet of this culvert flows down the side of the embankment which is eroding.

DEC

Some type of engineering study should be made of these structures. Recommendations for maintenance and repair of these structures should be forwarded to this office. We might point out that in case of failure of one or both of these structures, the City of Troy could be liable for downstream damages occurring to downstream residents or property.

Sincerely,

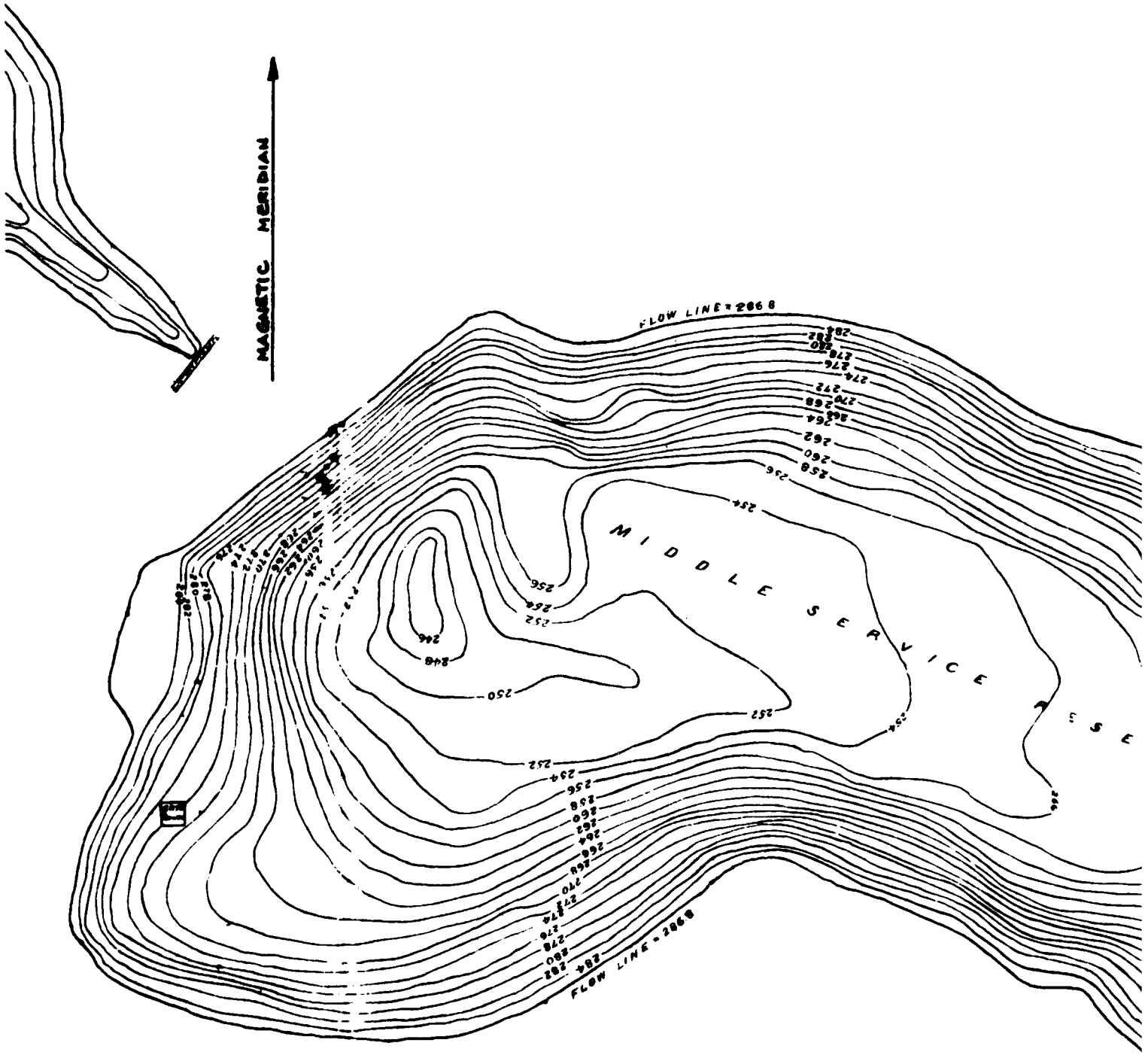
William Coleman
Dam Safety Section

DEC

APPENDIX G

DRAWINGS

TABLE OF CONTENTS



FROM OWNER
REDUCED TO 72 % OF ORIGINAL

TROY WATER WORKS.

MAP OF

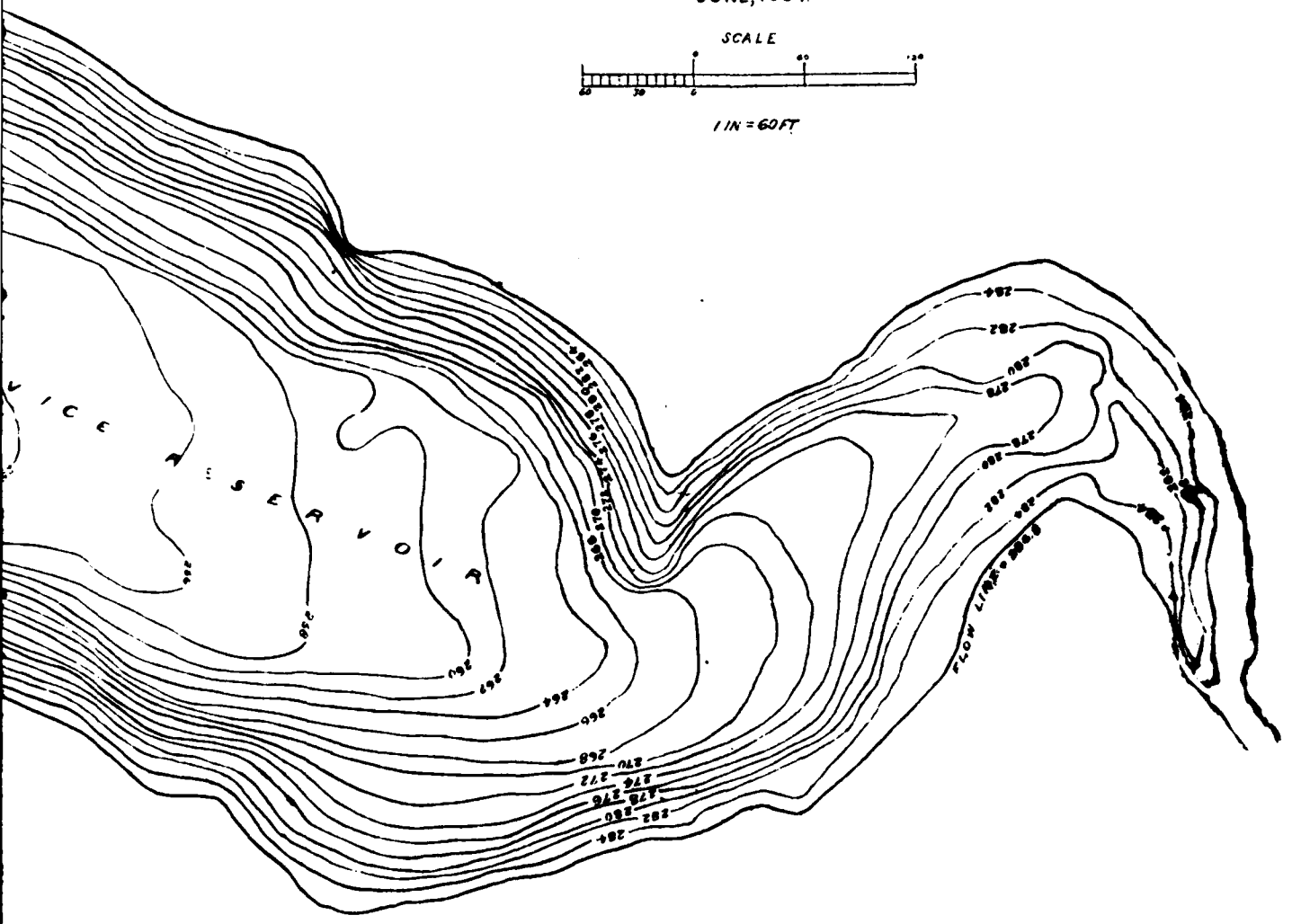
OAKWOOD AND MIDDLE SERVICE RESERVOIRS,

TROY, N.Y.

JUNE, 1894.

SCALE

1 IN = 60 FT



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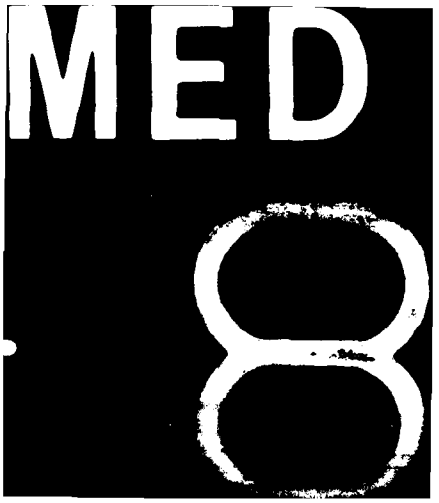
G-1 CTM DWG NO. 81-51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